REPORT

OF THE

COMMISSIONER OF PATENTS

FOR THE YEAR 1854.

AGRICULTURE.

WASHINGTON:
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LETTER

OF THE

COMMISSIONER OF PATENTS,

TRANSMITTING

The Agricultural portion of his report for the year 1854.

February 8, 1855.—*Ordered,* That there be printed, in addition to the usual number, fifty-five thousand copies of the Report of the Commissioner of Patents which relates to Agriculture, five thousand of which shall be for the use of the Commissioner of Patents.

United States Patent Office,
February 6, 1855.

Sir: Agreeably to the design of Congress, as indicated by the appropriation of the 4th of August, 1854, for the collection of agricultural statistics, and the procurement and distribution of cuttings and seeds, I have the honor to transmit herewith the Agricultural portion of my annual report.

I am, sir, very respectfully, your obedient servant,

CHARLES MASON,
Commissioner.

Hon. J. D. Bright,
President of the Senate.

PRELIMINARY REMARKS.

EXPERIMENTS WITH SEEDS.

A considerable share of the money appropriated by Congress for Agricultural purposes has been devoted to the procurement and distribution of seeds, roots, and cuttings. It was believed that in this manner the greatest benefit could be realized, and the intention of Congress most fully complied with.

A prime object has been the introduction and naturalization of new and useful vegetable products, hitherto unknown in the United States. Measures have been taken to procure from every quarter of the globe such seeds, plants, roots, and cuttings as would admit of useful and successful cultivation in this country. These, as far as they have already been received, have been placed in the hands of persons most likely to try the experiment fully and fairly. It is confidently hoped that the number of those products which contribute to the comfort and sustenance of the human family may, by this means, be considerably augmented. Many of the experiments made with this view will probably prove abortive; but if, out of the whole number tried, a single one shall have proved as eminently successful and useful as the potato or the rice plant have done, at a former period, or, what is more probable, if many of these new products shall prove capable of successful cultivation, and become useful in a limited degree, the trouble and expense attendant upon making all these experiments will be richly compensated. The advantage resulting from the introduction of a new commodity of average utility for consumption or commerce is of more value to the country than the acquisition of a new province.

From the eastern coast of Asia, much may reasonably be expected. Having been heretofore little explored, its peculiar products are almost

unknown; possessing a climate, which, from natural causes, greatly resembles our own; its vegetable kingdom, in its general type, being like that met with upon the Atlantic coast of this continent, which differs so much from that found on the western parts of Europe and America.

A considerable number of rare seeds, roots, and plants have already been obtained from China and Japan, and means have been adopted to increase that number hereafter. Some of these have been brought directly from those countries, through the care and attention of Commodore Perry, and various other individuals. Others have been obtained indirectly through European channels. They have all been placed in good hands, and as widely disseminated as practicable. It is hoped that they will prove productive of great benefit.

But the attention of the office has not been exclusively directed to the introduction of seeds or plants altogether new. Much care has been taken to obtain and distribute improved varieties of the products of this country already known and cultivated.

When it is recollected how much the value of our live stock has been increased by similar means, the hope of improving our grains, grasses, leguminous plants or esculents, by importation from foreign lands, will not be deemed chimerical. The importance of such a measure seemed to be sufficient to justify the sending of an agent to Europe last autumn, in order to make the best selection of seeds, and procure them direct from the growers. Consequently, a large quantity of valuable seeds of the last year's growth was procured and disseminated throughout all portions of the Union. It is confidently expected that this will result greatly to the benefit of the agriculturists of the country. Similar benefits are also hoped for from the distribution of choice varieties of seeds produced in particular sections of the United States, and not generally known in others. For instance, the number of bushels of corn which, with a given amount of labor and expense, can be grown upon an acre of ground, depends in no small degree upon the kind of seed planted. Some varieties are capable of producing fifty per cent. more than others. Even an increase of a single bushel to the acre, where the soil and cost of culture are the same, is a matter of very great consequence. If, by any course of husbandry, an annual permanent net increase of one dollar in the value of the product of every acre of ground can be secured, such a result would in fact be augmenting the real intrinsic value of all the land so treated, more than ten dollars per acre. A proper selection of seed will in most cases effect much more than this. How well may every farmer, then, find himself repaid

for all the pains bestowed in making such selections, and how useful will be the means which will increase in the greatest practicable degree the facilities for doing this on the widest possible scale!

Accordingly, great pains have been taken to ascertain what varieties of corn, wheat, or other agricultural product have been found most prolific and valuable. These have been procured and disseminated in small parcels in every portion of the country where they were thought likely to be advantageously cultivated. In this manner, they became tested as to their adaptation to the soil and climate of those portions, and, where successful, their gradual introduction will naturally follow.

The small quantity in which some of the seeds have been distributed has sometimes been objected to. Instead of sending a gill of wheat or other small grain to one individual for the purpose of experiment, some persons have supposed that a more liberal distribution—perhaps a bushel to each individual—would be attended with better results. That there are strong arguments on each side of this question is undeniable; but the preponderance seems clearly in favor of the course pursued. The smaller packages, weighing but two or three ounces, can be conveniently distributed through the mails. By this means, too, the opportunity of experimenting can be placed within the reach of several hundred times as many persons than would be if distributed by the bushel. A small amount will, in most instances, test the adaptation of the grain to any particular soil and climate as effectually as would be done in a larger quantity. The testing on a more extensive scale is only at most postponed for a year or two, and the experience required during that time is not entirely lost. Failure sometimes results from unknown and accidental causes. These are more likely to prevent success in one instance than in many. Although the person who should obtain a bushel of choice wheat for trial might be induced to take more pains with it than he who had but a gill; still, out of the hundreds who might obtain the latter quantity, some might be found who would take more pains than either. Indeed, it is to be hoped that when a proper interest is created in this subject, a large proportion of those who shall receive one of these small packages of grain will be induced to take special pains in its cultivation for the first year or two—more, in fact, than could be expected of one who had a bushel or two in his possession.

The seeds should be sown in drills at liberal intervals, well cultivated, and the choicest heads selected with which to pursue a similar course the succeeding year. Is it not highly probable that by following such a course for a few years, a vast improvement might be made

in even the very best varieties of wheat with which we are acquainted? The remainder of the produce of each year's cultivation might also be sown in drills on good ground and carefully cultivated. When ripe, let a few of the choicest heads be selected from this growth, and reserved to be planted in drills in the same manner on the following year. This second growth will constitute class number one of the second crop. The remainder of the first year's growth, after removing all small and defective heads, should also be planted in drills and cultivated, and would constitute class number two of the second crop. On the third year, class number one of the second crop should be treated in the same way as class number one of the first crop had been; and thus from year to year, a small selection being made from the first class of the previous year's growth, a new family will be commenced somewhat superior to any of its predecessors. A judicious system of hybridizing might still further increase the improvement, and would be well worthy of an experiment. On the third year, class number two of the second crop, which would probably have increased to two bushels or more, may be thinly sown broadcast, or, what would be better, by a good drill. The produce of this sowing might thenceforth be used as seed for field use, and would be found vastly improved in character and constitution. It would constitute an improved variety for those to experiment with who wish to do so, with larger parcels than those furnished by the Patent Office. When thickly sown it would probably produce large crops of fine wheat for a few years, and then relapse into an ordinary variety; but by pursuing the course above recommended, the vigor of the plant and its product might be constantly kept up, and its quality improved. At least, the probability of such a result is sufficiently great to justify experiments of the character above suggested. The method pursued of distributing the grains in small parcels would be well calculated to enable many persons to try such experiments.

In fact, it is highly probable that extraordinary varieties of any grain might in such a manner be readily obtained. By selecting a choice head of wheat from almost any field—by drilling, cultivation, and continued selection—by a judicious system of hybridizing to obtain a similar advantage to that derived from crossing with animals,—if success is not finally attained, it would be contrary to all experience in analogous cases. By pursuing a course similar to this, have all the improvements in live stock been made. By like means, choice varieties in corn and other products have been obtained. Should not a similar result be expected from this mode of treating the small grains?

Experience is ready to give this question a satisfactory answer. A grain of wheat is found in the crop of a wild goose, another in the chest of tea from China, and a third by accident vegetates in a cleft in the rocks, which shoot up alone into a vigorous growth. These become respectively the progenitors of the "Goose wheat," the "Tea wheat," and the "Rock wheat." For a few years, each acquires a great reputation in the agricultural world, and then relapses into mediocrity. What is the explanation of these phenomena? Why, simply that each of these grains of wheat was originally nothing very extraordinary; but growing alone at first, and being afterwards carefully planted and cultivated for a few years, they acquired a sturdiness of growth, constitution, and reproductive power, as superior to that of the densely crowded broadcast-sown wheat of the field, as the physical health and strength of the farmer, who labors daily in the open air, is greater than that of the pent up denizen of the crowded city. It has had plenty of room, air, and light, as well as proper cultivation and food.

Having thus attained a point of comparative excellence, it is deemed something extraordinary. Afterwards, when employed in ordinary field-culture, when sown broadcast and left untended, having neither the room nor the food to enable the plant to attain its full development, it relapses into its original condition. Any other vegetable or animal product would be subject to similar changes under like treatment.

It is therefore earnestly suggested to every one who has the requisite taste and ability that he should undertake a course of experiments of the kind above contemplated, or any other which his own judgment may dictate, with a view not only of testing choice varieties of such seeds as he may procure, but also of improving the qualities of those very varieties. If the seeds distributed through this office can fall in small parcels into the hands of persons, in all sections of the country, who will pursue the course herein suggested, it may reasonably be expected that the most substantial benefits will result from such a course.

C. M.

REPORT

ON THE

SEEDS AND CUTTINGS RECENTLY INTRODUCED INTO THE UNITED STATES.

UNITED STATES PATENT OFFICE,
February 5, 1855.

SIR: Agreeably to your suggestion, herewith I furnish such information relative to the nature, origin, culture preparation, and uses of the principal seeds, cuttings, &c., imported or introduced into this country within the last two years, as might prove beneficial or acceptable to a great body of our agriculturists, who may have received them for experiment. I regret that I am not able to report at length on many of the products, as they are quite as important, perhaps, as those which are more fully treated. I beg leave to add, that there are numerous useful products in Europe and other distant parts, that never have found their way into this country, which, I am persuaded, might be cultivated with a fair chance of success. The time for believing that the exclusive possession of any benefit contributes solely to the privilege or prosperity of any particular country or kingdom, has gone by; and the principles of free and universal intercourse and exchange are now conceded to constitute the surest foundation for the happiness of nations. This is so obviously true in matters of this sort, that it cannot for a moment be doubted. Hence it may be inferred that there is ample room for exertion on the part of our general government, as well as of States or individuals, to increase our agricultural and botanical riches, more especially those products which so conspicuously and permanently add to our useful and economical resources.

Among the foreign products which have more recently been imported or introduced, and distributed for experiment, and which appeared to be susceptible of profitable cultivation in this country, I would instance the following:

CEREALS AND OTHER PLANTS, CULTIVATED FOR THEIR FARINACEOUS SEEDS, STRAW, OR HAULM.

Turkish Flint Wheat, from Mount Olympus, in Asia; a fall variety, with rather large, long, flinty berries no very dark-colored, and pos-

sessing remarkable properties for long keeping in a moist climate, or for transportation by sea without kiln-drying. It has proved itself both hardy and prolific in the Middle States, and its culture deserves to be extended. The spikes are of good length and size, having only a light beard.

Algerian Flint Wheat, from the province of Oran. This variety has a remarkably large berry, rather dark-colored, and weighing 70 pounds to a bushel. From a sample sown in the valley of Virginia, in November last, it yielded at the rate of 35 bushels to the acre, a berry equal in size and weight to the original. The spikes are large, bearing an enormous beard.

Pithusian Flint Wheat, from the island of Iviça; another fall variety, resembling the Algerian, but having larger berries, varying in color from light to dark.

Syrian Spring Wheat, from the "Farm of Abraham," at the foot of Mount Carmel, in the Holy Land. The berry of this variety resembles that of the last preceding, and is reputed to have matured in sixty days after sowing.

Cape Wheat, from the Cape of Good Hope, procured by Commodore Perry, of the Japan Expedition. This is a beautiful light-colored wheat, slightly flinty in its character, and doubtless produces an excellent flour. It probably will do much better at the South than at the North, if sown in autumn, unless it should prove to be a spring wheat. If successful, it will be liable to degenerate, unless the seed is often replenished or changed.

Spanish Spring Wheat, (Trigo candeal,) from Alicante; a beautiful variety, of unsurpassable whiteness, and is reputed to have ripened in less than ninety days after sowing. It will doubtless succeed well as a winter wheat at the South, and a March or spring variety at the North. The berry is rather long, plump, and slightly flinty in its character. The flour is of unrivalled whiteness, and is celebrated in Spain as entering into the composition of candeal bread (pan candeal.)

White Hungarian Wheat, (Blé blanc de Hongrie, of the French,) from the south of France. The spikes of this variety are white, of medium length, very compact, and square-like, terminating abruptly, or not tapering to the extremity; chaff, smooth and thin; spikelets, containing four grains, which are quite large, short and plump, or rounded, white, and slightly transparent. Weight, 66 pounds to the bushel. It is reputed to be about a week longer in ripening than other sorts, but from its superior qualities it well deserves a trial in this country, as a

fall or winter wheat at the South, and as a March or spring variety at the North.

Red-chaff White Wheat, from England, having a very large, short, rounded berry, generally soft, but often transparent. It is rather tender, and probably would not succeed as a fall wheat north of Virginia.

White Neapolitan Wheat, (Richelle blanche de Naples,) from the south of France, where it is much cultivated. The spikes are long, but not very compact; terminal spikelets, having short awns from one-fourth of an inch to an inch in length; chaff, delicately tinged with a dull yellow or copper color; grains, large, considerably elongated, and generally of a yellowish-white color. It has the disadvantage of ripening late, and is believed to be too tender for the North. Possibly, it may prove to be a March or spring wheat, if sown early in the Middle States or at the South.

Girling's Prolific Wheat, from England; a very prolific fall variety, with a large, short, plump, brown berry, but inclined to be soft. Like the Red-chaff White, it is thought to be tender, and unsuited for the Northern States.

White Chilian Wheat, from Santiago de Chili; a beautiful variety, with large, rounded, plump, white grains, resembling those of the Red-chaff White from England, and, like which, it is believed to be too tender for the North.

Saumur Spring Wheat, (Blé de saumur de mars,) originally from the valleys of Anjou, a southeastern department of France, and is a very remarkable variety for fall or winter-sowing. The berry is rather soft, though full, of a reddish color, and much esteemed by farmers for its early maturity, which perfects itself some days before the ordinary sorts. As its name implies, it may also be sown in March, which will add to its value in this country as a spring wheat. If sown in autumn, it probably would succeed in the middle or central range of States.

Early Noë Wheat, (Blé de l'Ile de Noé,) introduced into the central part of France by M. de Noé, and is commonly known there under the name of *Blé bleu*. From its hardy and productive nature, it is gradually superseding the Saumur wheat in the high latitudes of Paris, and is much sought after on account of its precocity. As this wheat and the preceding variety have the property of ripening some days before the common sorts, if they succeed in our climate in this respect, a great point will be attained. A single week thus gained in ripening would often secure the crop from injury by the fly or rust, aside from the advantages to be acquired from an early market. It would probably succeed well as a spring wheat if sown early.

Geja Wheat, from the south of Spain; with a large, moderately long, full berry, of a brown color, rather inclined to be flinty. It probably would be too tender to sow at the North as a fall wheat, although it might succeed if sown early in the spring.

Large Northern Prolific Rye, from Germany; with a large grain, and doubtless will be suited to the Middle, if not to the Northern States.

Spanish Barley, from the south of Spain; with a full, well-filled grain, which promises well.

Common Black Oat, (Avoine noire de Brie,) from France. In the length of the straw, and the form of the panicle, this variety is similar to the Potato oat. The grain is rather large, well filled, and of a shining black color, lighter towards the point. It is very prolific, and about a week earlier than the Potato oat, weighing 42 pounds to the bushel.

Chenailles Oat, (Avoine noire de Chenailles,) from France; resembling the preceding in the character of the grain, but somewhat earlier and of taller growth.

Spanish Oat, from the south of Spain, with light-colored grains, heavy, and well filled with farinaceous matter. It probably would succeed well in the Middle and Southern States for late fall or winter-sowing.

Silver Buckwheat, (Sarrazin argenté,) from France; an esteemed sort, with whitish grains, and employed for the same purposes as the common kind.

White Quinoa, (Chenopodium quinoa,) from France, but originally from Peru, where it is a native. The grains are round, white, and about the size of mustard-seed. The leaves of this plant, before it attains full maturity, are eaten like spinach; but the seeds are the parts most generally used as food, being both nutritious and wholesome, as well as easy of digestion. They are prepared in a variety of ways, but most frequently are boiled in milk or soups, or cooked with sweet peppers and cheese.

This plant is very vigorous, quite insensible to cold, and produces an abundance of seed on a good, light, warm soil. Its culture is simple. If intended for its grain, it may be sown in a sheltered border early in the spring, in order that it can be transplanted before the return of summer heats; or it may be sown in open culture in drills, in the middle of the spring. When the plants become of sufficient size, they are removed and planted at the distance of twenty inches apart, well exposed to the sun. If desired for the leaves only, they may be set nearer to each other, and the stalks cut off at the first gathering, in

order to cause them to branch out for a succession of crops. By watering during the summer, should there not be rain, the product of leaves will be incessantly renewed.

Forty Days Maize, (Maïs quarantain,) a dwarf variety from the south of Spain, reputed once to have ripened high up in the Alps in forty days after planting. The object of introducing this grain into the United States was on account of its quick growth, early maturity, and sweet flavor in the green state, as well as the delicacy of the bread made from its meal. Besides, it appears to be well adapted to the high latitudes and elevated valleys in many parts of the country, where most other varieties of corn will not thrive, and with a chance of a successful result in crossing it with the larger sorts, to which it might impart, in a degree, its quality of early ripening, if not its taste.

Indian Millet, or Dourah Corn, (Holcus sorghum,) from St. Martin, in the West Indies; described at length in another part of this volume.

LEGUMES.

Early Long-podded Bean, from England; quite as prolific as the common Long-podded, but considerably earlier. It probably will do well at the South, but of doubtful success north of Virginia.

Long-podded or Butter Bean, from Germany; an esteemed sort for eating in a green state when shelled.

Early Dwarf French Bean, (Haricot flageolet, or Nain hâtif de Laon,) rather long, narrow, and cylindrical in shape, and of a whitish or pale-green color. It is one of the most esteemed varieties in the neighborhood of Paris; very dwarfy and rapid in its growth, and is much employed there as "snaps," or shelled in a green state, and even when dried. From its bushy and dwarfy habit, it will bear close planting—say from two feet to two and a half feet apart.

Pearl Bean, without strings, from Germany; a fine variety, used as "snaps" when green, or in a dried state when shelled. It probably will prove a runner.

Pearl or Round Turkey Pea Bean, from Germany; represented as an excellent and prolific sort, with yellow transparent pods.

Mexican Beans, (Frijoles,) two varieties, "Black" and "Reddish," treated of in last year's report.

Early May Pea, from England; already known to the market gardeners and seedsmen of the United States.

Early White May Pea, from Germany; represented as an excellent variety for early sowing.

Dwarf Hamburg Cluster Pea, from Germany; the best and earliest of the earliest sorts of that country.

Late Fall Golden Pea, from Germany; well adapted for very late sowing for autumn use, and not affected in its growth by mildew or heat.

Auvergne Pea, from England; a very hardy productive sort, growing to a height of four or five feet, of an excellent quality, and adapted for late sowing for fall use.

Capucine Pea, from Germany; a fine variety to be used in succession.

Champion of England Pea, from England; much esteemed as a second sowing; already well known to American seedsmen, as well as to private growers.

Oregon Pea, described in last year's report, the origin of which is unknown. It greatly resembles, if it is not identical with, the Oleaginous pea, (*Dolichos viridis*,) lately introduced into France, from China, by M. Montigny, French consul at Shanghai, to whom we are already indebted for the Sorgho Sucré and the Chinese Yam.

Japan Pea, also described in last year's report, and has been since cultivated with remarkable success.

Soja Bean, (Soja hispida,) procured by the Japan Expedition; two varieties, the "White" and the "Red-seeded," both of which are employed by the Japanese for making *soy*, a kind of black sauce, prepared with the seeds of this plant, wheaten flour, salt, and water. This "soy," or "soja," which is preferred to the *Kitjap* of the Chinese, is used in almost all their dishes instead of common salt. The soy may be made as follows:

Take a gallon of the beans of this plant and boil them until soft; add bruised wheat, one gallon; keep in a warm place for twenty-four hours; then add common salt, one gill, and water, two gallons; and put the whole into a stone jar, and keep it tightly closed for two or three months, frequently shaking it; and then press out the liquor for use.

The seeds of this plant only require to be sown in a warm, sheltered situation at the time of planting Indian corn, and cultivated as any garden bean.

White Lupine, (Lupinus albus,) from the south of Spain, where it is cultivated to a limited extent for forage, as well as for soiling. It was employed as food by the ancient Romans, and, as with the inhabitants of the present day, was ploughed into the soil as a manure. In Germany, also, it has been found to be one of those plants by which unfruitful, sandy soils may be most speedily brought into a productive

state. The superiority of this plant for the purpose of enriching the soil depends upon its deep roots, which descend more than two feet beneath the surface; upon its being little injured by drought, and not liable to be attacked by insects; upon its rapid growth; and upon its large produce in leaves and stems. Even in the north of Germany, it is said to yield, in three and a half to four months, ten or twelve tons of green herbage. It grows in all soils except such as are marly and calcareous; is especially partial to such as have a ferruginous subsoil; and, besides enriching, also opens stiff clays by its strong stems and roots. It abounds in potash, nitrogen, and phosphoric acid, and is considered the best of green manures, being almost equal to farm-yard dung. The seeds are somewhat expensive, and about the size of peas. They should be sown as early in the spring as the season will admit, without injury from frost, and the plants will blossom in three or four months; soon after which, they may be turned into the soil, and succeeded by most of our field or garden crops. Although rather slow to decay, its decomposition may be hastened, if desirable, by the addition of caustic lime.

Yellow Lupine, (Lupinus luteus,) from Germany, where it is extensively cultivated as a green or vegetable manure, to be ploughed under in poor soils. Large crops are also obtained for the seeds, which, when ground or crushed, serve to fatten cattle and swine. Its culture is nearly the same as the preceding.

Garbanzo, (Cicer arietinum,) or chick-pea, from Alicante, in Spain. This is an annual plant, much cultivated in the south of Europe, as well as in Asia and Africa. Cooked whole, it is not easy of digestion; but when eaten in the form of a soup or porridge, it is much esteemed. The famous Parisian dish called *purée aux croûtons*, and the *olla podrida* of Spain, particularly the former, are composed of this pea. In warm countries, it is sown in autumn, and harvested the following summer; but in a more temperate climate, it is sown in spring, and gathered in autumn just before its perfect maturity, in order that it may more readily be cooked.

Gallardon's Large Light-colored Lentil, (Ervum lens,) from the south of France, but much cultivated in the neighborhood of Paris, both in the garden and open field. It is usually sown in lines or hills, but seldom broadcast. It is best adapted to a dry and sandy soil, as on rich land it runs too much to stalks and leaves rather than seeds. In France, it is sown late in March or in the beginning of April. In order that the lentils may be of a better or firmer quality, they are shelled or threshed out only as they are required for use. They may be cooked

with bacon or in the form of a porridge or soup, like split peas. The ancient Romans are said to have caused them to germinate before cooking, in order to develop their saccharine qualities.

PLANTS CULTIVATED CHIEFLY FOR THEIR TUBERS OR ROOTS.

Potato Seed, (Solanum tuberosum,) from Germany; obtained from the apples, or balls, of the potato haulm. The importance of experimenting with seed and the mode of culture are treated at length in another part of this volume.

Fluke Potato, from England; a superior variety, much esteemed at Liverpool for its flat shape, and fine qualities for domestic use, and for long keeping. It bears late planting, yields well, and has never been known to be much affected by the rot. In order fairly to test its adaptation to the Middle or Northern States, it would require to be cultivated for several years.

Regent Potato, "The Potato" of London market. It is roundish in shape, of good size, having a yellowish, rough skin, dry, mealy, of excellent flavor, and light-colored within. It matures rather early, keeps well during the winter and spring, and is productive in its yield.

Lapstone Kidney Potato, a fancy variety lately originated in Yorkshire, England, by a shoemaker. From its slight resemblance, in shape, to a lapstone, it has acquired its name. It is rather small, smooth, and light-colored without, and perfectly white and flour-like within, when cooked.

Early White Potato, from England; another fancy variety of small size; finger-shaped, and early to mature.

Chinese Yam, (Dioscorea batatas,) originally from China, but more recently from France, where it is proposed as a substitute for the common potato. It is fully described and treated of at length in another part of this volume.

Earth Almond, or Chufa, (Cyperus esculentus,) from the south of Spain. In addition to what is said of this plant in another part of this volume, in order to remove any prejudice which may exist in supposing that it is identical with the creeping cyperus, *(C. repens,)* or nut-grass, which is found growing wild on the banks of streams, in pastures, and cultitivated ground, from New York to Florida and Louisiana, I would state that the latter differs essentially from the chufa in its height, as well as in the size, shape, and color of its spikelets. The roots, also, contain many fibrous branches, often terminating in edible tubers, about the size of a pea, creeping continuously along with, and just below, the surface, and send up numerous suckers, which are regarded by Southern

planters as a great scourge to their crops. The chufa is quite different in this respect, only throwing up several stalks from one root, like the common potato, but does not spread.

Considerable attention has long been devoted to the cultivation o the chufa in the south of Spain, where it is stated that more than $400 have been realized from an acre in the short space of five months.

Turnips.—Through the liberality of Messrs. Charlwood & Cummins' extensive seedsmen of London, the office received the following twenty-six varieties of turnip-seed, on condition that they should be sent to every State and Territory in the Union for experiment, with the view of testing their adaptation to the soil and climate; said experiments to be conducted as uniformly as practicable, and the result made known to the public in the form of a report: Skirving's Swede, or Ruta-baga; Rivers' Stubble Swede; Laing's Swede; Green-topped Swede; Dale's Hybrid; Green-topped Six-weeks; Snow Ball; Strap-leaved; Small Yellow Malta; White Globe, or Norfolk White; Green Round, or Norfolk Green; Green Globe, or Green Norfolk; Golden Ball; Red Globe, or Norfolk Red; White Tankard, or Decanter; Green Tankard, or Decanter; Yellow Tankard, or Decanter; Red Tankard, or Decanter; Green-topped Scotch; Purple-topped Scotch; Skirving's Purple-topped Scotch; Early Stone, or Stubble-stone; Yellow Stone; Red-topped Stone; White Dutch; Yellow Dutch.

It may be needless to state that the above-named request has been complied with, so far as this office is concerned, and the seeds distributed with an appropriate circular to all parts of the United States.

There have also been imported from England, in addition to the above, the following sorts, and extensively distributed far and wide: Rivers' Swede; Ashcroft's Swede; Sutton's Green-topped Yellow Hybrid; Sutton's Purple-topped Hybrid; Sutton's Cruicksfield Hybrid; Sutton's Early Six-weeks; Border Imperial; Orange Jelly; Yorkshire Paragon; Sutton's Improved Green Globe; and Lincolnshire Red Globe.

Four varieties were likewise imported from France, namely: Navet long des vertus, Navet de Freneuse, Navet turnip, and Rave d'Auvergne.

Radishes.—Two varieties of radish were imported from England, the "Yellow Turnip," and the "Long Scarlet." From France, there were received the "Large Field Radish" (Raifort champêtre,) "Olive-shaped Radish," (Radis rose demi-long,) "Short Scarlet Radish," (Radis rose demi-long écarlate,) and the "Winter Rose-colored Radish," (Radis rose d'hiver.)

Beets.—Of these, there were imported from England the "London Red," and the "Bassano," the latter a turnip-rooted variety, which originated in Italy, and is already known to American cultivators. There was also introduced from France the "Scaly or Rough Red Beet," (Betterave rouge crapaudine,) and from Germany the "White Silesian Sugar Beet," the latter of which is particularly valuable for feeding to milch cows.

Of the *Mangold Wurzel*, two sorts were imported, the "Large Yellow Globe" from England, and the "Large Long Yellow" (Betterave jaune grosse,) from France. The former is a fine variety which originated in England, growing mostly above the surface of the ground, which renders it particularly fit for shallow soils. The latter holds the first rank in the neighborhood of Paris for feeding milch cows. There is also the "German Yellow," (Betterave jaune d'Allemagne,) introduced into France about thirty years ago, and is now extensively cultivated. From this a sub-variety has been produced, called *Betterave jaune des Barres*, which some consider as a model forage beet, or mangold wurzel. It is of elliptical form, and so little buried in the ground as to be easily torn up by the hand, and is equal in quantity and quality to the varieties named above.

Carrots.—Of carrots, five sorts were imported: "St. James" from England, and the "Short Red," (Carotte rouge courte,) "Long Yellow" (Carotte jaune longue,) "Vosges White" (Carotte blanche des Vosges,) and the "Green-crowned White" (Carotte blanche à collet vert,) from France.

Parsnips.—Of these, only two varieties were introduced, named the "Hollow-crowned," from England, and the "Round Parsnip," (Panais rond,) from France.

Onions.—From France, three varieties of the onion were imported: the "Brunswick Dark Red," (Oignon rouge foncé de Brunswick,) "Cambray," (Oignon de Cambrai,) and the "Early White," (Oignon blanc hâtif.)

A variety of *Leek* (Poireau long) was also imported from France.

The *Celeriac or Turnip-rooted Celery* (Apium graveolens rapaceum) has been introduced both from Germany and England. It is mentioned at length in another part of this volume.

Chickory, or Succory, (Chicorée sauvage à café,) from France; principally cultivated for use in salads, and for its roots to roast for mixing with coffee. Mentioned at length in another part of this volume.

PLANTS, THE LEAVES OF WHICH ARE CHIEFLY USED FOR SALADS, POTAGE, &C.

Early York Cabbage, from England; already known to American cultivators.

Large Ox-heart Cabbage, (Chou cœur de bœuf gros,) from France; one of the best kinds cultivated.

Alsacian or Quintal Cabbage, (Chou d'Alsace ou quintal,) from France, with short thick stalks, and very large heads, having festooned leaves, of a very bright green color. The head of this cabbage grows to an enormous size, on rich, new land.

Large Red Cabbage, (Chou Milan des vertus,) from France; the largest of the Milan varieties, which are noted for growing more open, and in being more delicate and less musky in their flavor. It requires a very rich soil.

London Cauliflower, from England; a superior variety.

Medium Cauliflower, (Chou-fleur demi-dur,) from France; possessing qualities between the fine, tender sorts and those which are coarse and tough.

Broccoli.—There have been imported from England three varieties of broccoli: the "Mammoth," "Imperial White," and the "Purple Cape;" the latter direct from the Cape of Good Hope.

Two varieties of *Kohl-rabi*, or "Turnip-stemmed Cabbage," one from England, and the other from France; described in another part of this volume.

Brussels Sprouts, (Chou de Bruxelles,) from France; producing in the axils of the leaves small heads, resembling those of other cabbages. They are very tender, and much esteemed. By successive sowing, in the Northern and Middle States, from April to June, this excellent vegetable will be fit for use from early in autumn till late in the winter, as it stands frosts better than most other kinds.

Sea Kale, (Crambe maritima,) from England; a notice of which will be found in another part of this volume.

Lettuces.—Of lettuce, three varieties were received from Germany: the "Blood Red," "Spotted" or "Tiger," and the "Asparagus lettuce." There are three kinds, also, from France: the "Large, Brown Slow-growing," (Laitue grosse brune paresseuse,) with greyish-green leaves, marked with pale, brownish spots, having very large and regular heads slightly tinged with red at the top; "Roman Pale-colored Marsh," (Laitue romaine blonde meraîchère,) an esteemed sort, much cultivated in the neighborhood of Paris, forming heads without tying; and the

"Gotte" or "Gau" lettuce (Laitue gotte,) a variety suitable for growing under glass for winter use.

Celery.—Of celery there was imported from France one variety, "Early Dwarf," (Celeri court hâtif,) which, from its compactness of growth, does not require to be tied before earthing up, with fine dense heads, and prompt in blanching; two varieties, also, were imported from England, "Seymour's White Solid" and "Cole's Red," both of which are already known to American growers.

True Giant Asparagus, from England.

Lettuce-leaved Spinach, (Epinard à feuille de laitue,) from France; with very large, thick, dark-green leaves, which form themselves into a bunch or head.

PLANTS CULTIVATED FOR THEIR BERRIES OR FLESHY FRUITS.

Large Yellow-fleshed Pumpkin, or Squash, (Potiron jaune gros,) from France; the fruit of which is very heavy, of a gold yellow within, and grows to an enormous size.

Cassabar Melon, from Asia Minor, which, when pure, is of a sweet, delicious flavor, and may be eaten, even by invalids, with impunity. These seed were reported to be seven years old.

Valencia Melon, (Melon de Valencia,) from the south of Spain; a variety of the Canteleup tribe, celebrated for its delicious, sweet flavor, and preferred to all others in the countries where it grows.

Summer Green-fleshed Melon, (Melon d'été à chair verte,) from France.

Honfleur Melon, (Sucrin de Honfleur,) from France ; very large, somewhat long, with thick ribs; having a rather coarse flesh, but full of sweet juice.

Prescott Canteleup, (Cantaloup Prescott,) from France; a variety much caltivated, and the most esteemed of any at Paris. Its color varies from green to a silvery tint, having ribs more or less rough.

White-fleshed Winter Melon, (Melon de invierno con carna blanca,) from the south of Spain.

Winter Melon, (Melon d'hiver,) from the south of France; with a smooth rind, greenish-white, brittle flesh, juicy, and of a delicate flavor. It keeps well as late as the month of February.

Long, Thick, Smooth Cucumber, from Germany; suitable for salting when nearly turning yellow, and after extracting the seeds.

London Short, Prickly Cucumber, from England.

Long White Cucumber, (Concombre blanc long,) from France.

Gherkin Cucumber, (Concombre à cornichon,) from France; producing small green fruits, much prized for pickling.

Long Violet-colored Egg-plant, (Aubergine violette longue,) from France; a small, long-fruited variety, of much better flavor and delicacy than the large oval or round sorts.

Early Red Tomato, (Tomate hâtive,) from France.

Sweet Pepper, (Pimiento dulce,) from the south of Spain.

PLANTS CULTIVATED FOR FODDER, MANURE, OR FOR THEIR USES IN MANUFACTURES AND THE ARTS.

Sorgho Sucré, (Sorghum saccharatum?) a new gramineous plant from France, the seeds of which were sent to that country some four years since from the north of China, by M. de Montigny, the French consul at Shanghai. A full description of this product will be found in another part of this volume. There is one feature in regard to this plant, perhaps it may be well to state: It would seem that in a tropical climate, while the sugar-cane is perfecting its growth, there might be three crops of the Sorgho obtained from the same ground; and should it prove to be as rich in saccharine matter as has been alleged, a greater amount of sugar would be obtained from a given space than from the cane, besides the advantages of the distribution of the work throughout the year, instead of a press of labor forced upon the planters at one time. There is also another feature in this plant which would seem to be worthy of notice, as a forage plant in the Middle and Western States: If the seeds are sown early in May, two crops of fodder can be raised from the same roots in the season—say, one about the first of August, and the other in October.

Moha de Hongrie, (Panicum germanicum,) from France; an annual, good for forage, green or dry, very productive, of quick growth, and flourishes well on dry soils. The seeds may be sown from May until July. The following extract from the "Bon Jardinier" for 1855 will give some idea how this grass is appreciated in France:

"My first attempts on a large scale did not succeed well; but one of my neighbors, among others, made such good use of it for feeding horses and cows, that I was induced to try it again, which I did with success. I sowed it in 1835, in a dry, calcareous soil, when I remarked in it the quality of great resistance to drought. It remained green and in an excellent state in spite of the high temperature and great drought of that year, even in places which had not been manured. This time, I sowed it in drills, and regularly weeded it; but haricot beans and Panicum italicum, sowed and treated in the same manner, withered and lost their leaves, while the Moha remained green and fresh. The disastrous drought of 1842 gave new proof of the superiority of this

plant in this respect. In the middle of a calcareous plain, where everything had perished, the Moha remained unchanged. A considerable portion of the heads were tolerably well filled with seed, and the threshing gave a good though diminished product. When it is intended to perfect the grain the Moha must be sown in May; when it is only wanted as a green forage, it may be sown as late as July, at the rate of ten to twelve pounds to the acre in the first case, and fourteen to sixteen in the latter."

Sainfoin, (Hedysarum onobrychis,) two varieties from France: the "Common" (Sainfoin ordinaire,) and the "Double-bearing," (Sainfoin à deux coupes,) both of which are perennial. The former is best adapted for poor soils, and will not admit of but one crop in a season. The latter is generally cultivated in all parts of France, is more vigorous, hardier, and more productive than the common sort, yielding two cuttings in a year. The farmers consider it necessary to sow it upon good land, lest the plants should deteriorate, as on soils of inferior quality the sowings must be occasionally renewed. As its stalks are thicker and harder, and its seeds larger than those of the other variety, it must be sown more closely—say, at the rate of six or seven bushels to an acre. The sowing is generally done in spring, but sometimes early in autumn. If the seed is a year old, it is not liable to vegetate.

Serradilla, (Ornithopus sativus,) an annual from Germany; employed in Portugal as an artificial forage, in dry, sandy soils, where it affords an early pasturage for cattle. As it is somewhat tender, it probably would only answer for our Southern or, perhaps, the Middle States. From its fine quality and great productiveness, it is desirable to experiment with it as far North as it would be likely to grow, when it would be better to sow it in spring with other grain, in order to obtain in autumn a green crop, or cut it for hay.

Heracleum Sibiricum, (Berce de Sibérie,) a perennial from Germany, producing a very abundant, early green forage. It is sown in autumn and comes up the following spring.

Chilian Clover, or Alfalfa, (Medicago sativa?) from Chili; a perennial variety of lucerne, which succeeds well in our Middle and Southern States. It differs from the common lucerne of Europe only in the color of its flowers, which are purple. It is sown in autumn in drills, in a deep, rich soil, producing good forage for animals, either green or dry, the following summer, and will endure for many years. Deep culture is absolutely necessary, in order to allow the extension of the roots into the earth.

Yellow or Black Trefoil, (Medicago lupulina,) a biennial from Eng-

land, at present considerably cultivated in the central parts of France. One of its advantages is, that it grows well in dry and inferior soils. Its forage, though less abundant than other trefoils, or clovers, is of fine and good quality, and not dangerous to cattle when eaten green, in producing hoven. It is much more valuable, however, for an early sheep pasture, than to convert it into hay. It may be sown in March or April, like other spring grains.

Cow Grass, or Perennial Clover, (Trifolium medium vel perenne,) from England; usually sown among other grass-seeds for a permanency, but not with the common red clover.

Alsyke or Swedish Clover, (Trifolium hybridum,) from England; believed to have originated in the south of Sweden, where it is particularly abundant. It is best adapted to moist and strong soils, and has the property of self-sowing, when the flowers are left to mature, which will cause it to endure fifteen, twenty or more years. The usual course to pursue is to cut it once a year for hay, afterwards leaving it for pasturage. Its flowers, which put forth in June in great profusion, resemble in shape those of the common white clover, but are larger and of a rosy tint, of a sweet, agreeable odor, and afford an excellent forage for bees. It may be sown with autumn or spring grain; with the latter it is preferable, to prevent winter-killing.

Suckling Red Clover, (Trifolium filiforme,) from England.

Perennial Ray Grass, (Lolium perenne,) two varieties from England, the "Italian" and the "Improved." The former is said to be distinguished from the common ray-grass of England, by its earlier maturity, larger leaves, deeper green color, and by the greater height to which it grows. It is usually sown in autumn, as is the general practice with grass-seeds in the south of Europe. After the field is harrowed, it is sown at the rate of sixteen to eighteen pounds to the acre, and the seed rolled in. In the following autumn, the turf is covered like an old meadow, and the crop of the next year is more than double. It may also be sown in spring. It is eaten greedily by cattle, whether green or dry, and yields fifty per cent. of hay.

The "Improved Ray Grass" possesses several desirable properties, which recommend it to the attention of cultivators, the principal of which are—its adaptation to a great variety of soils; the facility with which it is propagated, by reason of its seeds being produced in abundance, and their uniformity in ripening; and the fibrous structure of its roots, which fits it in an eminent degree for alternate husbandry. Notwithstanding all these good qualities, its culture in the Middle and Southern portions of the Union, at least, should be entered into with

caution, from the great heats and summer droughts. Again, at the extreme North there is danger from the winter frost.

Meadow Fescue, (Festuca pratensis,) from England; an excellent perennial grass, either for alternate husbandry or permanent pasture, but more particularly the latter. It is relished well by cattle, horses, and sheep.

Sheep's Fescue, (Festuca ovina,) from England; an admirable perennial grass, well adapted for growing on elevated sheep pastures, where it is well relished by those animals, which prefer it to all other herbage where it exists.

Rough-stalked Meadow Grass, (Poa trivialis,) a valuable perennial grass, from England suitable for mixed pastures, particularly on damp soils, and where partly shaded by trees.

Sweet-scented Vernal Grass, (Anthoxanthum odoratum,) a perennial from England and France, yielding but a scanty herbage, and is not particularly relished by any kind of live stock, perhaps with the exception of sheep. It is remarkable for giving out a pleasant odor during the process of drying. It has been recommended to be sown in sheep pastures for the purpose of improving the mutton, a quality which it is said to possess, and which is founded on the fact that places in which it naturally abounds are said to produce the finest mutton. From its dwarfy growth, and the close sward it forms, it is recommended to be sown on lawns or ornamental grounds.

Burnet Grass, or Pimprenelle, (Poterium sanguisorba,) an annual from France, well suited for pasturage on poor dry soils, whether sandy or calcareous. It may be sown early in the spring.

Goldbackia Torulosa, a new perennial oil plant from Germany, producing an abundance of seed, suitable for making oil. It is said to be hardy, and affords an early pasturage for sheep.

Gold of Pleasure, or Camelina Sativa, (Miagrum sativum,) an annual from France, which produces a finer oil for burning than rape, having a brighter flame, less smoke, and scarcely any smell. It succeeds well on light, shallow, dry soils, and in our Middle and Southern States it probably would produce two crops in a season. Besides the use of the seeds for oil, the stems yield a coarse fibre for making sacks and a rough kind of packing-paper, and the whole plant may be employed for thatching. The culture is similar to that of flax.

Colza, or Rape, (Brassica campestris oleïfera,) two varieties from France, the "Colza froid" and "Colza parapluie." The former is highly recommended, the yield being much greater than the common varieties of rape. It may be distinguished by its luxuriant growth and

reddish seeds. The latter, principally cultivated in Normandy, though less productive, has the advantage of throwing out lateral branches, which, falling towards the ground, support the plant and prevent it from lodging in consequence of heavy rains that may happen near the time of maturity. Both varieties may be sown from the middle of July till the end of August, and treated in every respect like other winter rape.

Spurry, (Spergula arvensis,) an annual from Germany and France, where it is much cultivated as a winter pasture for cattle and sheep. Mutton, as also the milk and butter of cows fed with it, are stated by Thaër to be of very superior quality. It is usually sown on stubble-fields after the grain crops have been removed.

But the principal use to which this plant can be applied in this country is as a green manure, on poor, dry, sandy, or worn-out soils. It may be sown either in autumn on the wheat stubble, or after early potatoes, and ploughed under in spring preparatory to the annual crop; or it may be used to replace the naked fallow, which is often hurtful to lands of so light a character. In the latter case, the first sowing may take place in March, the second in May, and the third in July, each crop being ploughed in to the depth of three or four inches, and the new seed then sown and harrowed. When the third crop is ploughed in, the land is ready for a crop of winter grain.

Sand or Sea-side Lyme Grass, (Elymus arenarius,) a perennial from Holland. This grass is not eaten by any of our domestic animals, owing, no doubt, to its excessive hardness and coarseness. Sir Humphrey Davy found, by analyzing the soluble matter afforded by this plant, that it contained one-third of its weight of sugar. Hence it has been called the "Sugar-cane of Great Britain." It has been recommended, however, that the hay made from it be cut like chaff and given to cattle, either alone or mixed with other food.

The purpose for which this plant is generally employed, and for which its creeping, matted roots fit it in an eminent degree, is for binding loose sands, when sown with the Arundo arenaria, to prevent the encroachment of the sea.

Sea Reed, (Arundo arenaria,) from Holland. This plant, like the preceding, is unworthy of cultivation as food for cattle, but can only be employed to advantage in raising a barrier against the encroachment of the ocean.

The object of importing the seeds of these grasses was, to sow them on such parts of our coasts as may be threatened or are suffering injury from the sea, particularly on beaches or sand-hills which are liable to changes from abrasion or drifting winds. The world-renowned dykes

of Holland owe much of their strength and durability to the protection afforded by those remarkable plants. With regard to their culture, I have no definite knowledge.

TREES AND SHRUBS.

The Carob Tree, or St. John's Bread (Ceratonia siliqua).—Of all the seeds imported for the purpose of distribution there are none more interesting nor more valuable than those of the carob tree. The pods, when matured, contain a few drops of a substance resembling honey. The tree is unquestionably of Eastern origin, and is supposed to be identical with that upon which St. John fed while in the wilderness. The seeds were procured for the office from Alicante, in Spain. In Murica, Valencia, Catalonia, and other provinces in that country, it abounds, and frequently forms, with the olive and other valuable trees, large forests. It was, without doubt, introduced there by the Moors, who knew its nutritive qualities as a food for their horses, mules, and cattle. They probably brought it from Palestine and Egypt, whence it appears to have originated. In these Spanish provinces, it now grows naturally in every kind of ground, not excepting the driest and most barren spots, where the underlying rock shows itself more frequently than earth. Its roots, twisting in every direction, accommodate themselves to the lightness or depth of the soil; while the trunk, remarkable for its smooth and light-colored bark, attains in sheltered positions a colossal size. The branches, furnished with greyish colored leaves, spread majestically around the trunk, and, when loaded with fruit, hang down quite to the ground in the form of a tent. The fruit ripens rapidly, and such is its abundance and weight that it is necessary at once to gather it. The pods are sweet and rich in sugar, and animals feed on them with avidity, and become quite fat and in good condition for work.

There are several varieties of the tree. The produce is necessarily in proportion to the attention given. It blooms twice a year—about the first of February and the middle of September—and when well watered arrives at a considerable height, and sometimes covers a space of one hundred feet in diameter, bearing upwards of a ton of pods. It will doubtless succeed in the Southern and perhaps in the Middle States.

The Olive (Olea europæa).—Of the olive, it has been said, with much truth: "Olea prima omnium arborum est;" and when we consider its productiveness, longevity, and usefulness, a little enthusiasm on the subject, perhaps, would not be altogether misplaced. The present importation is by no means the first attempt to cu tivate this tree

this country, as it had already been introduced into California by the Jesuits one hundred and fifty years before. In about the year 1755, Mr. Henry Laurens, of Charleston, imported from remote parts of the globe a great variety of useful and ornamental productions, among which were olives, capers, limes, ginger, Guinea-grass, the Alpine strawberry, (which bore fruit nine months in the year,) red raspberry, and blue grapes; also directly from the south of France, apples, pears, plums of choice varieties, and the white Chasselas grape, the latter of which bore abundantly. The fruit raised from the olive tree was prepared and pickled, equal to those imported.

In 1769, the olive was introduced into Florida, by a colony of Greeks and Minorcans, brought over by a Dr. Turnbull, an Englishman, who founded a settlement called "New Smyrna."

In 1785, a society was incorporated in South Carolina for the promotion of agriculture. The object was to institute a farm for agricultural experiments, to import and distribute foreign productions suitable to the climate of Charleston, and to direct the attention of agriculturists of the State to economical objects, as well as to reward those persons who should improve the art of husbandry. Among other objects of interest, the society imported and distributed some cuttings of vines and olives. The latter answered well, but the climate near Charleston proved too moist for the grapes. Attempts have been made to propagate the olive from seeds in various parts of the South, but hitherto with little success. This may be attributed to a tendency in the olive to sport into inferior varieties when so planted; but there is every reason to hope that the new importations of cuttings of improved kinds will increase the production in many parts of the South.

Congress, in the year 1817, granted four townships of land in the present State of Alabama, on a long credit, to a company of French emigrants, for the purpose and on the condition of their introducing and cultivating the olive and grape; but the enterprise never was prosecuted to any considerable extent, and it finally fell through, and the lands reverted to the government.

Of the olive stocks and cuttings recently from France, the following varieties were received and distributed in the Carolinas, Georgia, and other States bordering on the Mexican Gulf: Olivier blanquet nain; Olivier vermillion nain; Picholine nain (a variety yielding the kind of olives most celebrated for pickling, and is not very particular in the choice of soil and climate); Olivier verdal nain; Olivier de cruan nain; Olivier de salon (a variety producing a small round fruit, good for oil,

and prefers dry, elevated ground); Olivier bouquetier nain; Olivier gros Redonaon; and Olivier violet.

The Fig (Ficus carica).—The fruit of this tree is a great and wholesome luxury, both in a green and in a dried state, and its multiplication in our Southern and Southwestern States cannot fail to be fraught with great advantage. It will grow well upon the poorer and drier soils, provided it is sheltered, and can be propagated with great ease; and such is the goodness and abundance of its fruit, and the number of its varieties, that in some parts of Southern Europe it goes by the name of the "Providence of the Poor." In Spain it grows side by side with the carob and almond trees, and lines the fields and vineyards, its deep-green boughs forming an agreeable shelter from the heat of the sun.

The nature of the soil and its aspect influences considerably the choice and cultivation of the different kinds of figs. The white varieties, for instance, seem to prefer an elevated position and a strong, light soil; while the darker kinds succeed best where the situation is sheltered and low. A very choice sort, the fruit of which is of a deep rose-color, while the trunk of the tree is nearly black, seems to thrive best in low, shady places, provided it be exposed to the rays of the rising sun. It is possible to increase the varieties of the fig *ad infinitum*, either by seed or by the more common method of cuttings, inclined and buried from two to three feet in the earth. In the third year the young tree is pruned, and the head is formed by leaving three branches, which in due time are covered with fruit. Some cultivators graft them in various ways about the time when the sap begins to move. With due attention, the product is greatly improved and increased, although few fruit trees, perhaps, bear so abundantly, considering the little trouble taken with them.

In all countries which may properly be called "fig climates," two crops are produced in a year. The first is from the old wood, and corresponds with the crops of England and the middle portions of the United States; and the second from the wood of the current year, the figs produced by which, in the last-named countries, are never ripened except in hot-houses. In Greece, Syria, and Egypt, a third crop is sometimes produced. The first crop is ripened, in the south of France and in Italy, in May, and the second crop in September.

The only variety of cuttings lately imported from France was the large "White Fig," (Figuier blanc,) which is sufficiently hardy, with slight protection, to withstand the climate of the Middle States.

The Prune (Prunus domestica).—The scions of two varieties of

prunes, "Prunier d'Agen," and "Prunier Sainte Catherine," have been imported from France, and distributed principally in the States north of Pennsylvania, and certain districts bordering on the range of the Alleghany mountains, in order to be engrafted upon the common plum. These regions were made choice of in consequence of their being freer from the ravages of the curculio, which is so destructive to the plum tree in other parts as often to cut off the entire crop. It has been estimated that the State of Maine, alone, where this insect is rarely seen, is capable of raising dried prunes sufficient to supply the wants of the whole Union.

The *Prune d'Agen*, which is considered the best for drying, is of good size, of a violet-color, with deep-yellow flesh of a delicious flavor. This variety succeeds best when engrafted upon a wild stock, or when it springs up directly from the root.

The *Prune Sainte Catherine*, in the climate near Paris, is also esteemed as excellent for drying. It likewise furnishes to commerce the well-known "Pruneaux de Tours." The tree is of medium size, about twenty-five feet high, and grows well both as a pyramid and as a standard. The branches are long, slender, and but little ramified; their shape being rather slight. Throughout their whole length there grow a large number of buds, so near to each other that on a branch a yard long there are often produced from fifty to sixty plums. Hence it is easy to conceive the excessive abundance of the crop of a tree thus laden with fruit, the productiveness of which is not equalled by any other kind. This plum is of medium size, obovate or nearly round, divided by a deep suture throughout its length. The stem is slender, about three-fourths of an inch long, curved at its upper part and inserted in a small cavity. The skin is fine, pale yellow, sometimes tinted with red on the sunny side, and lightly covered with a white transparent bloom. The flesh is yellowish, sometimes firm and adhering to the stone, very juicy, sweet, and agreeably flavored. It ripens in the neighborhood of Paris in September and October. This plum, beyond its unrivalled merits for preserving in a dried state, has the advantage of being an excellent dessert fruit when fully mature.

In very warm, dry climates, prunes are prepared by drying on hurdles by solar heat alone; but in France, they place the plums upon round wicker baskets, about two feet in diameter, and two inches deep, putting into an oven heated sufficiently warm to cause the fruit to wrinkle after an exposure of about twelve hours. The oven is again heated, continuing to increase the temperature until the plums become firm, when they are flattened by pressure between the fingers, while

under the process of desiccation. Great care is observed to remove the plums from the oven as soon as they arrive at a certain stage of dryness to prevent them from cooking too much. Finally, after the prunes are baked for the last time, the oven is heated as it should be for bread, in which the plums are exposed until they begin to swell and bubble, when they must be taken out. As soon as the temperature of the oven falls to about half-heat, the prunes are put back to remain over night. Then, if properly cooked, they are covered with a beautiful white "bloom." They are then assorted by sizes, and packed in baskets, boxes, or jars, for sale or use.

If it is desirable to make what are called "Pruneaux fourrés," the stones are taken out when they are about half baked, and insert in its place another plum which has also been deprived of its stone, and continue the cooking as above.

Raisin Grape-vines.—Two varieties of small grapes, the "Vigne chevelés," and the "Vigne Corinth," from which are made the Ascalon, Stoneless or Sultana raisins, and the Zante or Corinth currant, imported from France, and principally distributed in the Middle and Western States. The berries are small, often without seeds, with a fine pulp, and of an agreeable flavor. They are much used in a dry state in domestic cookery, and, should they succeed in this country, will add to the many varieties of useful and wholesome fruit already introduced. The English name of "currant" given to the Ribes rubrum, arises evidently from the similarity of that fruit to the small grape of Zante, or the common grocer's "Corinths," or "currants."

The Levant and Grecian Islands supply the largest proportion of dried currants for the markets, and retain their reputation by the general superiority of the fruit they furnish. Spain, Italy, and the southern portions of France, also supply a considerable amount. The method pursued for making these currants varies somewhat with the locality and the variety employed. They are more easily prepared than the larger grapes, which are known in commerce under the name of "raisins." These require to be dipped, in the first stage, into a rather strong ley, made of wood-ashes, sweetened by an addition of aromatic plants, such as thyme, lavender, orange leaves, &c.; but the small grapes here in question are merely gathered a few days after complete maturity, at the moment when it is perceived that the berries are about to fall from the vines. They are then placed upon hurdles of close wicker-work, or upon large sheets, in the sun. When it is perceived that the berries are detaching themselves from the main stalk, although still preserving their stems, the operation is often hastened by striking

the bunches slightly with a stick. The stalks are then separated from them by means of a sieve, and the dust and other remains are got rid of by winnowing; after that, they are packed in boxes, where they are pressed in closely, covered with thick paper, and kept in a dry, cool place.

A very important point in the management of all varieties of grape is the mode and season for pruning. No general system or rule will suit. Experience must be the guide as to what will answer best in different climates, soils, and situations. A method which will do well in the North may be destructive to the plant in the South.

The Jujube Plum, (Zizyphus sativa,) a small tree or thorny shrub, from the south of France, bearing a reddish plum about the size of olives, of an oval shape and sweet clammy taste, including a hard oblong stone, pointed at both ends. From this fruit is made the "Jujube paste" of the shops. In Italy and Spain it is served up at the table in desserts during the winter season, as a dry sweetmeat. These seeds have principally been distributed in the Middle and Southern States.

Pistachio Nut, (Pistacia vera,) an extremely interesting tree, has been imported, not merely on account of its ornamental character, but because it is useful and produces agreeable nuts. For the twofold reason, a quantity of them has been imported from the southern part of Europe and widely distributed throughout the Middle and Southern sections of the Union. In favorable situations, it will attain a height of fifteen or twenty feet, and frequently, while a mere shrub of five or six years' standing, will bear. Its branches spread out widely, without being numerous; and the trunk is covered with a greyish-colored bark. The inflorescence takes place about April or May. The male flowers, which appear first, shoot from the side of the branches in loose panicles, and are of a greenish tint. The female flowers put forth in clusters in the same manner.

As the pistachio tree is diœcious, it is necessary to plant male and female trees together, or they will not produce. The nuts are of an oval form, about the size of an olive, slightly furrowed, and of a reddish color, containing an oily kernel of a mild and agreeable flavor. It is a native of Persia, Syria, Arabia, and Barbary, and is supposed to have been introduced into Italy in the second century by the Emperor Vitellius; whence it was carried into France, in the southern parts of which it is so far naturalized as really to appear indigenous. Later still, that is in 1770, it was introduced into England, where in sheltered positions it bears without protection from the cold of ordinary winters. The summers there are scarcely warm enough to ripen its nuts.

Although severe frost is to be dreaded, it will bear a greater degree of cold than either the olive or the almond, and hence is better adapted to the climate of our Middle and Southern States, where it is thought it could be cultivated with profit. The finest kinds are those known as the Aleppo and Tunis varieties—the former for its large size; the latter though smaller, for qualities which recommend it to French confectioners, who cover the fruit with sugar and chocolate, and flavor creams and ices with it. A similar pistachio nut is used in France in the preparation of sausages and in seasoning meats. It is considered as a tonic, and as beneficial for coughs and colds. It is frequently eaten raw, but oftener in a dried state, like almonds.

The Cork Tree, (Quercus suber,) from the south of Europe. Much is anticipated from the successful introduction of this product, as the acorns have been distributed throughout the Middle and Southern portions of the Union for experiment, where it is hoped that it will prove to be adapted to the soil and climate. Should a portion of the present distribution by any untoward circumstance fail to answer expectation, care should be taken by the office to obtain another supply for those who feel an interest in growing this useful tree. Plantations might be established in every favorable locality, so that in due time, the increasing wants of the country for cork may fully be met by the home supply. Therefore, if the introduction should prove successful, the enterprise cannot be regarded otherwise than of national importance.

This tree, under favorable circumstances, grows rapidly, and attains a height of upwards of thirty feet. Indeed, even in England, there are specimens over fifty feet high, with a diameter of more than three feet. In the south of Europe, cork trees are much esteemed, and lands planted with them are considered the most profitable of all that are not irrigated. They seem in general to prefer those localities where gneiss, sandstone, schistose and calcareous rocks abound. The substance so familiarly known to us as "cork," is the epidermis or outer bark, which sometimes acquires a thickness of two or three inches. This is rarely taken off until the tree has arrived at an age of fifteen or twenty years. This operation, which is carried on every six, seven, eight, or nine years, according to circumstances, is generally completed in the months of May and June, while the sap is still active in the tree. Although easy to accomplish, some care is required to avoid injuring the true bark, (liber,) which lies under the cork. A circular incision is usually made round the foot of the tree, and another near the branches. Longitudinal cuts are then made; and finally, by using the handle of a

hatchet as a wedge, the cork is detached from the under bark. The larger branches are treated in a similar manner.

Matē, or Paraguay Tea, (Ilex paraguariensis).—We are indebted for the seeds of this shrub to Lieutenant Page, of the U. S. steamer Water Witch, while engaged in exploring the sources of the Rio de la Plata, in South America. It is worthy of attention of persons living in the Middle and Southern sections of the Union. As a tree, it is highly ornamental; and wherever the Magnolia grandiflora will thrive, there it may be successfully cultivated. The inhabitants of Paraguay, and indeed most of those who use it on the southern part of this continent, attribute to it almost fabulous virtues. It is unquestionably aperient and diuretic, and produces effects very similar to opium; but most of the qualities so zealously attributed to it may, with some reason, be doubted. Like that drug, however, it excites the torpid and languid, while it calms the restless, and induces sleep. Its effects on the constitution, when used immoderately, are similar to those produced by ardent spirits; and when the habit of drinking it is once acquired, it is equally difficult to leave it off. The leaves of the plant are used by infusion, and all classes of persons partake of it, drinking it at all hours of the day at their various meals, rarely indeed beginning to eat before tasting their favorite beverage. Not only is this the case in Paraguay, Uruguay, and the Argentine Republic, but in Peru, Chili, and Ecuador, it is no less esteemed. They drink the tea from the spout of a pot which they call *maté*, adding to it a little burnt sugar, cinnamon, or lemon-juice. The wealthier or more refined class draw it into the mouth through a tin or silver pipe, called *bombilla*, which, being perforated with holes at one end, and inserted in the *maté*, or teapot, enables them to partake of the liquid without swallowing the smaller particles of the pulverized leaves floating on the surface. The quantity of leaves used by a person who is fond of it is about an ounce. The infusion is generally kept at the boiling temperature, but those who are accustomed to it seem to drink it thus without inconvenience. In the mean time, hot water is supplied as fast as it is consumed, every visiter being supplied with his *maté* and pipe. If allowed to stand long, the tea acquires an inky color. The leaves, when fresh, taste somewhat like mallows, or inferior Chinese green tea.

Morocco Dressers' Sumach, (Rhus coriaria,) from the south of Europe. The seeds of this shrub have been imported for experiment in the Middle States, where it is thought it will be adapted to the climate. It usually grows from six to eight feet in height, on dry, sandy, or rocky soils, in exposed situations. The branches and leaves are imported into

this country, and employed for tanning leather. It is said that they are used in Turkey and Barbary for preparing the Turkey morocco from the skins of sheep and goats. The seeds are sold at Aleppo, where they are eaten to provoke an appetite.

Furze, (Ulex europæus,) from Brittany, in France; a low prickly shrub, used as an excellent green fodder for cattle, when bruised. It was imported for a hedge-plant in the Middle and Southern States, and is described in another part of this volume.

French Broom, (Genista scoparia,) from France; a low, hardy shrub, growing from three to nine feet in height, with numerous straight, sharp branches, and used as fodder for sheep and for making brooms. It will grow on any dry, meagre or sandy soil, and is well adapted for protecting the sides of the embankments and cuttings of railroads.

It may be remarked that most of the fore-mentioned seeds and cuttings have been, or are to be, placed in the hands of members of Congress, and the secretaries of State and County Agricultural Societies, for distribution in their respective districts, reference having been made to their adaptation to the soil and climate, as well as to the economy of the sections where intended to grow. All of those procured in Europe were obtained from reliable sources, and are believed to be of superior quality and true to their kind, the vitality of which has been tested, as far as practicable, by actual germination under glass or by other means. It is not to be expected, however, that every variety will succeed in all parts of the country, if in any, where the experiments are to be made, as one may have the disadvantages against him incident to a change of soil and climate, as well as from an unfavorable season, which no human power can prevent or avert.

I am, sir, very respectfully, your obedient servant,

D. J. BROWNE.

Hon. Charles Mason,

Commissioner of Patents.

AGRICULTURAL CIRCULAR.

United States Patent Office,
Washington, February 1, 1855.

To Farmers, Planters, and other Cultivators:

The collection of statistics on Agriculture being one of the duties of this office, your aid is respectfully solicited. For the sake of convenience, questions intended for various individuals in all portions of the country are hereunto annexed, which are to serve rather as hints or suggestions, than to be literally followed in the replies.

As we seek no information that is not strictly reliable, it is hoped that your answers will be limited to those matters with which you are concerned, even although they may relate only to a single subject. If, therefore, you can communicate explicit and undoubted information on any of the topics under investigation, you will confer a favor by so doing. It is not expected that the reply of any one individual will relate to all the subjects embraced in this circular, but only to those with which he is practically familiar.

As another object sought to be attained by this office is the introduction and dissemination of new or improved agricultural products, we shall take pleasure in receiving and distributing any packages or parcels which may be committed to our charge, whether they consist of the seeds of cultivated plants, either of native or foreign growth, or those of our natural grasses, fruits, wild flowers, forest trees, or of the cuttings or sets of anything which may be deemed worthy of cultivation.

With our efforts in these respects, it is hoped that the interest you feel in agricultural subjects will induce you to co-operate as far as you may find it convenient and agreeable. Accurate statistics are desired as far as it is practicable to obtain them; but all that we can reasonably expect, in most cases, is the nearest approach to the truth to which your experience and judgment will lead you.

The subjoined inquiries are mainly intended to direct your attention to certain points on which information is desired. It is hoped, therefore, that the mention of these will not exclude any other maters of general interest that may suggest themselves. Your reply to those you

may feel willing to answer is solicited at as early a date as practicable; not later, at all events, than the first day of December next.

Very respectfully, your obedient servant,

CHARLES MASON,

Commissioner.

DOMESTIC ANIMALS.

What classes of animals can be raised to the best advantage in your section? Cost of rearing, and value at various ages? Cost of transporting each to the Atlantic or Gulf markets, alive, by canal, railroad, or on foot? What breeds are the most serviceable for labor, milk, flesh, or wool? Have you any imported or blood animals in your vicinity? If so, state the number, breed, history, and pedigree, if known, and the effects of crossing, if any, on your common stock, together with your mode of feeding and management.

ANIMAL PRODUCTS.

What is the cost of production and market value, in your vicinity, of wool, silk, wax, honey, cochineal, milk, butter, cheese, eggs, beef, mutton, pork, hams, lard, oil, hides, tallow, pelts, &c.? What is the cost, per hundred pounds, of transportation by canal, railroad, or otherwise, to the Atlantic or Gulf markets?

MANURES.

What manures are most in use with you, and which the most valuable for special crops? If guano, bone-dust, poudrette, super-phosphate, lime, gypsum, charcoal, ashes, fish, muck, or any other valuable fertilizers are employed in your vicinity, state the cost, modes of application, and their effects upon the respective crops to which they have been applied. The result of any accurate experiments would be desirable, especially as connected with any of our great leading staples—cotton, tobacco, hemp, flax, wheat, oats, rye, barley, rice, potatoes, or Indian corn.

AGRICULTURAL PRODUCTS.

What crops can be cultivated to the best advantage in your section? The best modes of cultivation? The maximum, and average yield of each, and the smallest yield that will pay expenses? Have you any established rotation of crops? What plants are cultivated for the purpose of ploughing under as a manure? Have you any remedies against the diseases and insects which infest your crops? What are your best modes of harvesting, storing, and preparation for market?

What is the cost of production and market value, in your vicinity, of the various kinds of grains, roots, hay and fodder, cotton, hemp, flax, hops, sugar, tobacco, &c.? What the cost per hundred pounds or per bushel of transporting each product, by canal, railroad, or otherwise, to the Atlantic or Gulf markets?

Special interest is felt at the present time in those plants which are employed in the manufacture of cordage, clothing, &c., such as cotton, hemp, and flax. Are any of these crops profitably cultivated by you? If so, have you any improved variety, new modes of cultivation, harvesting, or preparation for market?

MARKET AND KITCHEN GARDENING.

Please to give the names of the best varieties of garden vegetables, the usual time of sowing, periods of maturity, yield on a given space of ground, and their market values. What vegetables are brought into your vicinity from the North, South, East, West, or from beyond sea; at what seasons, and at what prices?

FRUITS, WINE, ETC.

What varieties of summer, fall, and winter fruits are cultivated with the best success in your section? What kinds are attacked by blight, mildew, or insects, particularly injurious to their perfect growth? If any, what remedies have you against their attacks? Have you any improved modes of cultivating fruit, harvesting, storing, and preparing it for market? What is the cost per bushel or barrel of transporting those kinds not perishable, to the Atlantic and Gulf markets, by canal, railroad, or otherwise? What is the current value per bushel or barrel of each kind in your vicinity? Is the grape cultivated with you for table use, or with the object of making wine? If for either, can you communicate any information relative to its name, history, cultivation, preservation, or the manufacture, cost, and market value of American wine? What fruits are sold in your vicinity grown at the North, South, East, or West; at what seasons, and at what prices?

LIVE FENCES.

What trees or shrubs form the best live hedges in your vicinity? How long have such hedges, if any, been established? Are they seriously affected by frost or drought? What was the cost per rod, the annual expense of trimming, and your mode of management?

NOTE.—Please to treat each subject under a distinct head, after the manner of the arrangement of the present Report; and, if convenient, leave one side of your manuscript blank.

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BY D. J. BROWNE.

REMARKS ON THE PRINCIPLES OF BREEDING.

From patient research and strict inquiry, it is now conceded as an established principle, that the most careful breeding of animals will only fix and make prominent certain peculiar features or "points" which are observed in certain families of the same aboriginal species or sub-species; and that the whole world might be challenged to bring evidence that any permanent intermediate variety of quadruped or bird, generated by the crossing of any two wild species which would continue to reproduce offspring like itself, and not finally revert back to one or other original type. In considering the great question of the "immutability of the species," so closely allied to the investigation of the different varieties, as far as the limited researches of physiologists and naturalists have gone, we are led to the conclusion that sub-species and even varieties are much more permanent, independent, and ancient than is at present currently believed. This conviction is founded on the diversities we see even in the most nearly allied races, which, it is most unhesitatingly maintained, are not merely the results of any transmuting influence of time, variation, or increase of food, change of climate, nor by hybridization, but that each distinct variety, however nearly resembling any other variety, or race, was produced at the beginning by a creative power—not by man, nor by his domestication, nor by any inherent tendency in the creatures themselves. Moreover, facts would seem to prove that hybrids, possessed of the power of reproduction, are even then saved from being barren only by their progeny reverting more or less rapidly to the type of one parent or the other; so that no intermediate race is founded. Things, sooner or later, either go on as they went before, or they cease to go on at all. This is the case with our domestic animals generally, and is well known to breeders as one of the most inflexible difficulties with which they have to contend, technically called by them "crying back."

Difference in food, change of climate, or other physical conditions to which they might be exposed, it is true, might naturally be expected to produce considerable corresponding modifications in the form, size, color, and coating of animals; as it is well known that cattle generally become very large and fat when reared for many generations on moist

rich soils, where good pasturage abounds, but are distinguished by the shortness of their legs; while on drier situations where the herbage is sparse, their whole bulk is less, and their limbs more muscular and strong. A country of heaths, or of other innutritious plants, will not produce a horse so large nor so strong as one of plentiful herbage, as is manifested between those reared on bleak mountains and fertile plains, high latitudes and more temperate climes, sandy deserts and watered vales. A change of situation in the one case, after a succession of generations, not only diminishes the size of the animal, but affects the character and form of his body, head, and limbs. Thus, if a London dray horse be conveyed to Arabia, and subjected to the same influences to which the native breed of that country is exposed, in the course of some generations he will present the leading characters of the Arabian horse. The head gradually diminishes in size, the limbs become fine and clear, the massive proportions of the whole body disappear, and not only will the external form of the native Arabian be acquired, but also something of his chivalrous traits. On the contrary, if the race thus changed be again conveyed to England, in the course of several generations, it will gradually acquire the properties it formerly possessed. This fact would seem to prove that the Arabian horse cannot exist in perfection in any of the northern or western countries of Europe, and that the humidity of the climate and the influence indirectly arising from that cause are the principal reasons of this change. Similar instances might be given in reference to the changes which have been observed in the sheep, the goat, and the hog. The former, when subjected to the climate of the West Indies, from Thibet, Spain, or Vermont, where their fleeces are fine, delicate, and soft, after a few years are entirely covered with rough, coarse hair, resembing that of the goat.

The breeding of domestic animals with a view to improvement may be said to be founded on nature's established law, that "like begets like;" and this axiom applies not only to the production of the qualities of external form and utility, but to the constitutional vigor and the predisposition to disease. This maxim, however, is only true in part, as there is a constant tendency to change, arising from a variety of causes, such as living in a different climate or on a different kind of food, as stated above. The selection and management of the parents and the treatment of the progeny also have their influence; but these may be regarded as the chief causes in the operation, notwithstanding there are others which are employed to develop and establish the desired quality and form.

In order to improve a race of animals, there are two modes advocated and practised by breeders—one commonly called the "in-and-in system," and the other that of "crossing." It was by the former whence sprung the fine cattle and sheep of Bakewell, and the superior cattle of the Collings, of England, many years ago, and had the effect, at least, of correcting the prejudice which had previously existed against breeding from animals of the same race or blood. But the system of breeding in-and-in, it has since been ascertained, has a speedy tendency to degeneracy, and to it must be imputed the absolute disappearance of the New Leicestershire cattle, and in numerous instances the deteriora-

tion and decreased value of the New Leicestershire sheep and short-horned cattle; in fact, this system is limited, so far as its benefits are concerned, unless the utmost care be observed in the selection and management of the animals, avoiding everything that can possibly tend to hereditary disease. It has, therefore, become a kind of principle with the most enlightened agriculturists of Europe and this country to effect some change in their stock every few years; and this change is most conveniently brought about by introducing a new ram or bull, which, in the judgment and experience of the breeder, will convince him will be likely to unite in their offspring the qualities sought. From their progeny, again, must be selected only those animals which more completely exhibit the requisite qualities, and so on, from generation to generation, until the character desired is fully developed. The importance of continuing this process for a number of successive generations is obvious, from the fact that peculiar traits of character often disappear in the first, and reappear again in the second or third generation. A desired character may be found in the parent, and inherited by only a part of the offspring, and the requisite point can only be uniformly developed by a careful selection through several consecutive generations. By this process, it is apparent that this system must be adopted; yet, at the same time, it is desirable to avoid too close alliances. Hence, it is considered better to breed more distant members of the same family together than those that are more nearly related.

In improving the breeds of animals, the chief points to be arrived at consist in reducing the parts of the least value to the least possible dimensions, which may be regarded as offal, as the head, neck, legs, &c., while the large quarter, or ham, and deep chest, for fattening, and square, well-set udder, large milk veins, mellow skin, and kind temper for milking qualities, should all be developed to the greatest possible extent. In order to produce these, a strict regard should be paid to pairing, with the view of correcting an imperfection in one animal by a corresponding excellence in another. For the character of the parent is more fully impressed upon the offspring when the former is in the most vigorous period of life. Consequently, neither very young nor very old animals should be selected for the purpose of breeding. All the conditions of soil, situation, climate, treatment, and food should be favorable to the object sought, and particular care should be taken to bring the male to the mind and taste of the female, and for the first year, at least, that the young are well supplied with an abundance of nutritious food, and with comfortable shelter and shade. Furthermore, every female, while pregnant, should not only be well fed, but care should be observed that the food be of a proper kind. Let it be remembered, also, that the growing fœtus has blood, flesh, and bones to form, as well as its mother, and therefore a greater proportion than usual of the constituents which go to make these must be supplied by the food of the dam; otherwise the fœtus will suffer as well as its parent. Again, it should be borne in mind that no breeding animal, either male or female, should be made too fat; for the former would often become too heavy and unwieldy by their joints and sinews being, as it were, possessed with little action or effort, by a load of useless and injurious fat; neither would a female, in a state of pregnancy, be in a

natural and safe condition, either as regards herself or her young, when thus unnaturally encumbered.

The system of "crossing" is founded on a principle just as secure, as regards care in selection, as that adopted by Bakewell in breeding in-and-in. For it is well known that certain diseases are hereditary, and so is color, none of which can be changed or got rid of, except by crossing. This system, therefore, requires great care in selection, as well as in management. The tendency of "like begetting like," is forcibly illustrated in the results of crossing various breeds of cattle, such as Devons with Herefords, both the color and form of the parent animals being thereby modified or changed. A cross is comparatively the operation of a moment, and its end once attained, the breeder's object is *not to repeat*, but to *maintain it*.

As a general rule, domestic animals of all kinds, which have been produced by crossing, are the most profitable, both for meat and milk. But in all cases where a cross is attempted, with the object of improving a breed, *be sure to have pure blood on one side*. Before attending much to the subject, some persons fancy that crossings and intermixtures may be infinitely multiplied and continued, restricted only by the algebraic law of permutation and combination; and such is the current opinion among many who are accustomed to see the divers colors and appearance of animals bred promiscuously on the same neighborhood or farm. But the observant breeder knows that such is not the case. For nothing is more difficult than to establish a permanent intermediate race, even between two nearly allied varieties. After a few generations the character reverts to that of one or other of the parents; the peculiarities of an old type reappear, and the new cross, on which the fancier was beginning to glorify himself, vanishes. The more heterogeneous are the parents, the more sudden is the return to old established characters. The mongrel progeny are either utterly barren, or their young exhibit the likeness of their grandsire or grand-dam—not of their actual parents.

HORNED CATTLE.

ORIGIN OF THE BREEDS.

The origin of our domestic animals, as well as the propinquity, or family relation, of the different breeds, has given rise to much fruitless discussion. But the account handed down to us by the sacred historian should be received as satisfactory, and regarded as conclusive by every one. "And out of the ground the Lord God formed every beast of the field and every fowl of the air, and brought them unto Adam to see what he would call them, and whatsoever Adam called every living creature, that was the name thereof." At this period, we have reason to believe, there were no wild animals nor hybrids, but one family of each race, unalloyed as to blood, uncontaminated by disease, and in the highest degree of perfection as to quality. But how many breeds Noah preserved of the anti-deluvian stock, neither sacred nor profane

writers give any definite information; while the breeds themselves, in modern times, afford ample materials for endless disquisition. The Mosaic account, for instance, is sufficiently broad to admit of a very wide construction; for the ox being a clean animal, according to the Adamic dispensation, subsequently re-ratified with the Hebrews at Sinai, either seven kinds or seven couple, (male and female,) of each kind, may have been preserved. The former is a definite number, and may therefore be assumed; but the latter is otherwise, leaving a wide field for the imagination to traverse among the existing breeds. Facts so simply and beautifully expressed as the above are beyond scepticism.

One of the most interesting questions to the historian, the naturalist, or the physiologist, is, the distribution of the animal kingdom over the globe, the alienation of many of its members from the domestic society of man, and the almost illimitable extent to which degeneracy and hybridization have taken place throughout the whole. That the different races were perfect at first cannot be doubted; and the question naturally presents itself, which is now the nearest to the original? In the case of the ox, for instance, is the Shorthorn the best representative of the bovine family? or does the Devon, the Hereford, or the Ayrshire breed, approach nearest to perfection? Or has he descended from the *Urus* of the ancients, an extinct race, but described by Cæsar as inhabiting the great Hercynian forest? The wild cattle which, at present, most resemble the tame, are those inhabiting the forests of the north-east of Europe, and the race still preserved in their purity at Craven, at Chillingham Park, and in Scotland; but it is far more likely that they represent a race which has been allowed to change from a state of domestication to wildness. To suppose that our present breeds have descended from the Asiatic gayol, or the bison of either hemisphere, would be a physical impossibility, as each of these species differ materially, in the number of their ribs, from the common ox, besides other anatomical distinctions. The query, then, still remains to be answered, what was the original state? This is a question of fact, and can only be answered from history. But history is silent; her first books have been destroyed by time, and the few lines preserved by Moses are rather calculated to excite than to satisfy our curiosity. Hence nothing is left for us but humbly to assume the garb of ignorance, and ever be deterred from arriving at anything like unanimity in this great work of improvement. Could we analyze the migrations of our own species from clime to clime; could we trace the progress of the human swarms which, in the obscurity of time, have successively advanced from various points, spreading as they have proceeded, sometimes mingling with other nations, sometimes driving the older occupants of the soil before them; could we develop the history of man, the relationship of race to race, and point out their original seats and starting places, then might we be able to throw a clearer light on the origin of our domestic animals; but I maintain most unhesitatingly, as at the beginning, that it was not owing to any inherent tendency in the animals themselves, nor to man, nor to his domestication, which has produced these diversities, unless we admit that he arranged the strata in the ribs of the earth, and prescribed the everchanging boundaries to the sea. We

cannot suppose, however, with any consistency, that the existing breeds of cattle in Europe and this country, as they at present appear, are, or ever were, in a pure state, although attempts, very inconsistent in their character, have been made to trace the mongrel progeny to one or more primary breeds.

It would be an important acquisition to the agriculturist, could it be ascertained how many races, or breeds, of cattle there are, and the localities best adapted to their respective constitutions; as it might afford means for tracing them back to their original purity, and therefore lay a surer foundation for improvement. The grand object of inquiry, as it comes home to every farmer, is the breed which best suits his own peculiar circumstances and locality, and the improvement of that breed in the highest degree; in other words, what is the best model of an ox or a cow—one that will return the greatest quantity of butcher's meat or dairy produce, of the best quality, from a given quantity of food? What the breed which best suits a particular farm, and what the best mode of bringing it to a comparative state of perfection?

VARIETIES, BREEDS, OR RACES.

To describe all the breeds of neat cattle in Europe and this country would be a task—would not only be difficult, but in a degree useless. There are certain varieties, however, the characteristics of which are important to be represented, both as regards their peculiar adaptation for particular localities, and for their usefulness for labor, flesh, or milk. Among these may be named the Shorthorns, the Devons, the Herefords, the Ayrshires, the Alderneys, and others, which, it is proposed, are to be described and delineated in this and subsequent Reports.

SHORTHORNED OR DURHAM CATTLE.

The Shorthorned Durham, or more properly, the "Improved Shorthorn," it is now unquestionably established, is the most profitable breed of cattle for meat or milk extant, provided they are furnished with a sufficiency of healthful and nutritious food, and are judiciously bred. The reasons for this are obvious enough, as no animal arrives so easily at maturity, few supply meat superior in quality, and none give a greater abundance of milk than it does, when properly crossed with other breeds. It has sometimes been urged, however, that Shorthorn cows are liable to obesity, patchiness, or a defective state of the adipose tissue, plethora, scrofula, and their consequents—chronic or acute pleurisy and pneumonia, phythisis, and other pulmonary complaints, milk fever, &c., &c. The majority of these diseases, it is true, is unfortunately the case, and no doubt, in many instances, they are hereditary. But, admitting such to be the fact, it by no means follows that the Shorthorns are more subject to the above named complaints than the Herefords and Devons, nor even so much so; for the fact of earlier maturity being in favor of the former, proves the greatest degree of health, while experience corroborates more forcibly this conclusion. It has also occasionally been asserted that, in another particular, the Shorthorns are

deficient; that is, they are considered to be but indifferent milkers. This objection can readily be overcome by crossing the best imported shorthorned breeds with our ordinary cows, by means of which good milkers can generally be insured.

The merit of laying the foundation of this breed has been conceded to Charles Colling, of Ketton, near Darlington, in England; but that Improved Shorthorns existed long before his day cannot be doubted, as the spirit of improvement in the breeders of the Old Shorthorn commenced in the valley of the Tees as early as the year 1750, which resulted in the improved modern breed. These efforts, begun by Sir William Quintin and carried on by Mr. Milbank, of Barmingham, were nearly perfected by Colling, whose principal success appears to have been in the formation of a proper conception of what this breed should be, both as to handle and symmetry, as well as the careful selection of such from a comparatively degenerate race, and judiciously breeding from them afterwards. The original "Teeswater," together with the still coarser breed known in the East Riding of Yorkshire as the "Holderness," especially the latter, was "a large ungainly animal, generally deficient in his fore quarters, with strong shoulders, slow and unprofitable to feed, as well as being but a middling beast for the butcher. The meat was coarse to the palate and uninviting to the eye." There was thus plenty of room, if not much encouragement, for producing something better; and the task was undertaken and entered into with as much spirit as discrimination by Charles Colling, conjointly with Robert his brother. The success of these gentlemen was, from the first, considerable. They produced, by judicious selections and crossings, the celebrated bull "Hubback," from which are descended the best Shorthorns of our day. His origin, as well as pedigree, is, of course, somewhat difficult to trace. The most authentic record of this bull we find in the following extract of a letter from John Hunter, jr., of Hurworth, near Darlington, coupled with his full pedigree, dated July 6, 1822, as given by Mr. George Coates, who was a contemporary of the brothers Colling: "I remember the cow which my father bred that was the dam of Hubback; there was no idea that she had any mixed or Kyloe blood in her. Much has been lately said that she was descended from a Kyloe, but I have no reason to believe, nor do I believe, that she had any mixture of Kyloe blood in her."

PEDIGREE.

"Hubback, (319,) yellow, red, and white, calved in 1777, bred by Mr. John Hunter, of Hurworth; got by Mr. George Snowdon's bull, (612); his dam, (bred by Mr. Hunter,) by a bull of Mr. Bankes', of Hurworth; g. d. bought of Mr. Stephenson, of Ketton." Snowdon's bull, (612,) it may be remarked, was directly descended from the celebrated Studley bull, (626,) believed to be the first recorded Shorthorn known.

Hubback was bought out of a by-lane or £8, and his success was as remarkable as it was profitable to his owners. His subsequent career, with his descendants Foljambe, Bolingbroke, Favorite, and Comet, together with their numerous progeny, permanently established

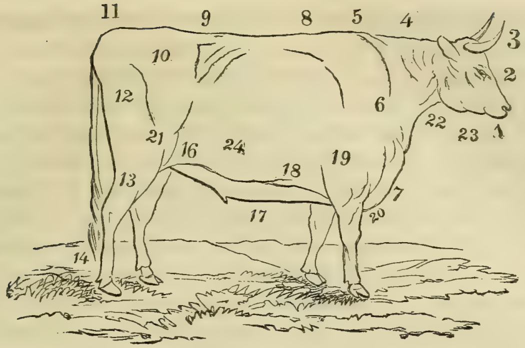
the breed, or variety of breed, at present so widely known and celebrated as the "Improved Shorthorn" in Europe and America.

The valley of the Tees powerfully presents the truth of that axiom, recognized by all thorough breeders, that "Good cattle are coincident with good soil, and are never found, as a race, on a bad one." The character of the soil and climate of this valley, so intimately connected with the origin and history of these cattle, may be placed as a preface to their rise, progress, perfection, and present wide diffusion; for nowhere in the world can there be found richer, better, nor more productive pastures, notwithstanding the severity of the climate is such that they are house-fed from five to six months in the year. The weather is cool and moist in summer, very rainy, wet, and bleak in winter, with not much continuous freezing, and but little fall of snow.

Geographically, though originally confined to the region of the Tees, the Shorthorns are now dispersed in almost every part of England, as well as in some parts of Scotland, where they thrive equally well, the number of herds in that kingdom amounting at present to upwards of five hundred, and the animals anually registered in the Herd Book exceeding six thousand. In France, Belgium, Italy, Prussia, Russia, and other parts of continental Europe, we find this breed as highly prized and almost as much sought after as in England. Again, we see them annually and progressively extending to Australia, New Zealand, Canada, New Brunswick, Cuba, Mexico, and our own country, where they improve every breed with which they are crossed. Within the last ten years a large number of bulls and cows of this race has been purchased from the best herds in England, at most extraordinary prices, and imported into the United States, the progeny of which are distributed in every section, where they are annually increasing, and becoming more than ever in public favor.

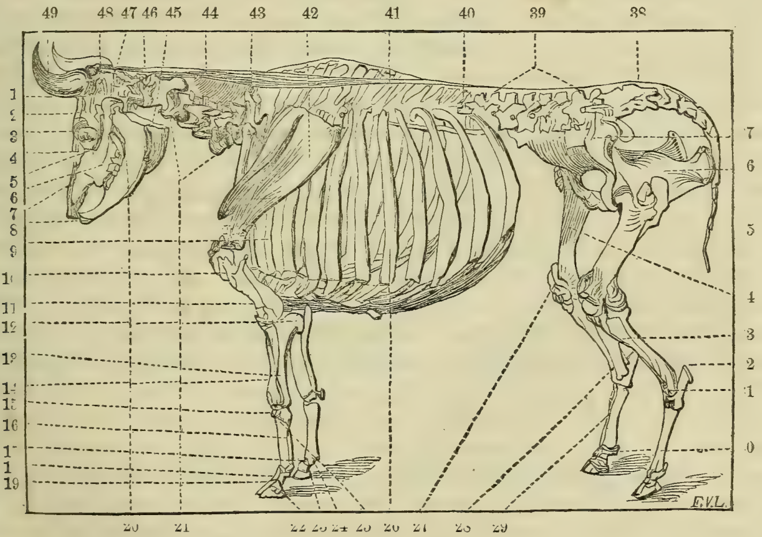
The Shorthorns vary in color, ranging from pure white to a bright rich red. The most fashionable of all, at the present day, is a mixture of the two, forming a deep or light roan, sometimes called hazel, or strawberry, as indicated in the cow "Fidelle," on plate 1. Color, however, should never be regarded as an objection to the real value of the animal, as the cow crossed by the same bull will often throw three different colors in as many calves. It may not be known to all that there are certain prejudices against white, in contradistinction to which, it only may be necessary to state that some of the very best animals in England have been white, or nearly so, as was instanced in the bull "Wiseton," bred and owned by the late Earl Spencer, and portrayed on plate 2 in this Report. Still, to correct this prejudice, or, perhaps, to act only in obedience to the fashion or taste in some parts of the Union, the red is now become more esteemed, as from it, when crossed with the white, there is frequently produced the most brilliant and favorite of the roans.

Before adverting to the properties of these animals, it may be advisable, in the first instance, to designate the points by which they are characterized in the following diagram:



No 1, indicates the nose, or muzzle; 2, the forehead; 3, the horns; 4, the neck; 5, the top of the plate-bones; 6, the shoulder-point; 7, the breast; 8, the chine, or back; 9, the loin; 10, the hip, or huckle-bones; 11, the first touch, or tip of the rump; 12, the thigh; 13, the hough, or hock; 14, the hind-leg; 15, the feet, or claws; 16, the flank; 17, the belly; 18, the brisket; 19, the shoulder; 20, the fore-leg; 21, the round, or pot-bone; 22, the under jaw; 23, the chap; 24, the ribs.

The diagram below will illustrate many of the points of the internal structure of the ox, to which reference often is made:



No 1, denotes the temporal bone; 2, the frontal bone, or bone of the forehead; 3, the orbit of the eye; 4, the lachrymal bone; 5, the malar or cheek-bone; 6, the upper jaw bone; 7, the nasal bone, or bone of the nose; 8, the nippers, found on the lower jaw alone; 9, the eight true ribs; 10, the humerus, or lower bone of the shoulder; 11, the sternum, or breast bone; 12, the ulna collar, its upper part forming the elbow; 13, the ulna; 14, the radius, or principal bone of the arm; 15, the small bones of the knee; 16, the large metacarpal or shank-bone; 17, the bifurcation at the pasterns, and the two larger pasterns to each foot; 18, the sessamöid bones; 19, the bifurcation of the pasterns; 20

the lower jaw and the grinders ; 21, the vertebræ, or bones of the neck ; 22, the navicular bones ; 23, the two coffin bones to each foot ; 24, the two smaller pasterns to each foot ; 25, the smaller or splint-bone ; 26, the false ribs, with their cartilages; 27, the patella, or bone of the keee ; 28, the small bones of the hock ; 29, the metatarsals, or larger bones of the hind leg ; 30, the pasterns and feet ; 31, the small bones of the hock ; 32, the point of the hock ; 33, the tibia, or leg-bone proper ; 34, the thigh bone ; 35, the bones of the tail ; 36, 37, the haunch and pelvis ; 38, the sacrum ; 39, the bones of the loin ; 40, the bones of the back ; 41, the ligament of the neck, and its attachments ; 42, the scapular, or shoulder blade ; 43, the bones of the back ; 44, the ligament of the neck ; 45, the dentata ; 46, the atlas ; 47, the occipital bone, deeply depressed below the crest or ridge of the head ; 48, a parietal bone, low in the temporal fossa ; 49, the horns, being processes, or continuations, of the frontal bones.

CHARACTERISTICS, OR POINTS, OF THE SHORTHORN.

The appearance and points of this breed may be thus briefly summed up from the "Encyclopædia of Agriculture :" "The head of the male animal is short, but at the same time fine ; very broad across the eyes, but gradually tapering to the nose, the nostril of which is full and prominent ; the nose itself of a rich flesh color, neither too light nor dark ; eyes bright and placid, with ears somewhat large and thin. The head, crowned with a curved and rather flat horn, is well set on a lengthy, broad, muscular neck ; the chest wide, deep, and projecting ; shoulders fine, oblique, and well formed into the chine ; fore-legs short, with the upper arm large and powerful ; barrel round, deep, and well ribbed up towards the loins and hips, which should be wide and level ; back straight from the withers, [top of the plate bones,] to the setting on of the tail, but still short ; that is, from hip to the chine, the opinion of many good judges being that a beast should have a short back, with a long frame. As a consequence of this, the hind quarter must, itself, be lengthy, but well filled in. The symmetry of frame at present to be found in a well-bred Shorthorn reaches as near perfection as possible, while few animals 'handle' so well, or to use a more technical phrase, have so 'fine and mellow a touch.' The hair is plentiful, soft, and mossy, with a hide not too thin, and, in fact, somewhat approaching the feeling of velvet. The female enjoys nearly all the same characteristics as the above, with the exception of her head being finer, longer, and more tapering ; her neck thinner and altogether lighter, and her shoulders more inclined to narrow towards the chine."

To the foregoing I will add the description of a thorough-bred Shorthorned bull, cow, and calf, by Mr. William Davis, of Chelsea, near London, a gentleman who has been engaged many years in painting most of the prize animals in Great Britain, and who is well qualified to judge of their characteristics, or points : "As to the general shape and qualities of a Shorthorned bull, his form should be symmetrical and level, with the shoulder or blade-bone slanting to the spine or backbone ; the ribs springing out like a barrel ; hip-bone full and long from the hip to the insertion of the tail, hind-quarter long from the tail to

near the hough, or hock, forming nearly a square from the tail to the flank; the fore quarters deep and breast-point near to the knee; wide between the fore-legs, and thick through the region of the heart, which is a sign of a good constitution; hind and fore-legs showing substance to the knee, and from the latter small but short-boned to the hoof; the under part of the abdomen nearly straight, which indicates but little garbage or offal. The head should be neat, well set, and rather high, with rough, curly hair on the forehead; horns rather stout, protruding straight from the head, turning up a little at their points or towards the forward; eye full; nose of a pale flesh color, with the muzzle small. Colors red or grey roan, mingled with white, pure white, red and white, in patches; blood red with an orange tint about the eye and nose, and sometimes a small white patch about the abdomen and flanks.

"A Shorthorned cow should have length of carcass, a light neck with the shoulder well back, and the ribs springing from the spine round, showing a good breadth of back; length from the hip-bone to the tail, which should have a square projecting rump, forming an angle; hind quarters long, extending nearly to the hough; flank low down near the milk bag, which should be nearly level with the hough; fore and hind-legs stout, but with small bones from the knee to the hoof; abdomen straight; head neat and rather up; light in the horns, which should project straight from the head, and turning in a little towards the forehead; eye full; muzzle small; depth of fore quarters; thick through the heart, and colors as in the male.

"A Shorthorned calf should have his bones well placed, without which the most careful feeding in the world would never make him a well-formed animal when grown; shoulder slanting; carcass long, with good wide hip-bones; length from the hip to the tail, with a square rump like an angle; length of quarter; legs short and fine in the bone; head neat and clean, and light under the throat.

"What is denominated a good handler should have the skin rather elastic, with the hair loose, and feel like velvet to the touch. On the contrary, some animals have a harsh coat, which is called wiry and not good. If any black hairs are found about the head or other parts, especially the muzzle, it is an indication that the animal is spurious, or mixed."

CONDENSED CORRESPONDENCE.

Statement of ANDERSON GORDON, *of Lewisburg, Conway county, Arkansas.*

Stock of all kinds do well in this county, particularly cattle, horses, and hogs. We have no imported animals. Cattle are raised at a cost of from \$3 to \$5 a head, at the age of three or four years. The cost of transportation from here to New Orleans, our usual market, is from \$4 to \$6 a head. Oxen bring, there, from \$35 to \$60 a yoke; cows and calves from \$10 to \$20 each; neat cattle from \$5 to \$15 each. Beef is worth from 3 to 5 cents a pound. We have no milk, butter, nor cheese for export.

Statement of Gideon Lane, *of Killingworth, Middlesex county, Connecticut.*

The cost of raising young cattle here till three years old is about $25 a head. The usual price at that age is from $25 to $50 each.

I have had considerable experience in raising both the imported and common breeds; and I think that a given amount of food will produce more meat in the Durham than in the common animal, or any other.

Statement of E. Babcock, *of Riley, McHenry county, Illinois.*

At present, the expense of cattle running on the prairies of this region is not taken into account, other than a little care in looking after them, and furnishing them occasionally with salt. Of late, some good imported animals have been introduced into the State. Much of what is regarded as common stock is a mixture of Longhorned Durhams Shorthorns, and Devons.

Wild hay is generally worth, with us, about $2 per ton. One ton of hay per head, with the gleanings of the corn fields and corn shucks, and perhaps two bushels of corn each, is sufficient for the winter. Say $5 per head for winter-keeping, and $1 more will cover all expenses for the year.

Neat cattle, at three years old, are worth about $30 each. Cows are worth from $24 to $28. Cost of transporting from Chicago to New York, per railroad, from $14 to $16 a head.

Statement of Martin Mondy, *of Vermilion county, Illinois.*

Cattle are the principal stock with us. The cost of raising a three-year-old steer is about $15; worth from $20 to $30. Our ordinary cattle are of good size, much larger than those in the States east of us. We have the Durhams in considerable numbers, and of pure blood. In my opinion, a cross of three-quarters Durham and one-quarter ordinary blood makes the best stock. Our common stock is best for the dairy.

Statement of Joseph C. Orth, *of McCleary's Bluff, Wabash county, Illinois.*

This kind of farm stock is very profitable in some instances, while in others but little can be made out of them. Farms contiguous to the river "bottoms" are generally well calculated for cattle, having the benefit of wild upland pastures during the summer, and the rich grass and cane pastures of the bottoms in the winter, for their sustenance. Only a few cows are kept for their milk, except for family use, and sometimes a very little in the shape of butter for sale. Of late, a few of our enterprising farmers have introduced the Durham breed; but beyond this, I doubt whether we have any improved breeds.

A good cow will command $25; but the average value, perhaps, is not over $16. Oxen, also, are coming much in use. Nearly every farmer in my neighborhood is the owner of at least one yoke, whereas but a few years ago, scarcely an ox could be seen. For many pur-

poses, where fast travelling is not the object sougnt, they are found to answer a purpose full equal to the horse, while the cost of keeping and rearing is probably not over half. They sell at from $40 to $100 a pair.

Statement of A. J. BOONE, *of Lebanon, Boone county, Indiana.*

There are, yet, no imported cattle in this county, but laudable efforts are being made for the improvement of stock generally. Crosses of the Durham with the common cattle have proved advantageous for beef, milk, and labor.

The selling price of cattle with us varies from $15 to $30 each, at three years old. Milch cows are worth from $15 to $50 each, as they come in.

Statement of H. F. MOORE, *of Big Mound, Lee county, Iowa.*

Cattle, here, are a great article of trade, for home use, the East, and California. A considerable interest is taken to introduce the best breeds, such as the Durhams, Devons, &c.

The average price of steers, at three years old, is $21; at four years old, $27. Working oxen bring from $50 to $90 a yoke.

Statement of ADMIRAL B. MILLER *and* JOSEPH BROBST, *of Knoxville, Marion county, Iowa.*

Cattle are found to be the most profitable stock raised here. They are now sold mostly to California emigrants. We have no imported cattle.

Statement of J. W. RAYNOLDS, *of Newbern, Marion county, Iowa.*

The cost of raising a steer till three years old is about $12. Some corn is given to calves the first winter; afterwards they are kept on hay made from the native prairie grasses, or on corn fodder. Cows are worth, here, from $25 to $30; calves from $5 to $7. Steers, at three years of age, are worth $25 each.

Statement of HUGH M. THOMSON, *near Davenport, Scott county, Iowa.*

With few exceptions, the horned cattle of this section may be called common. These exceptions are crosses with the Shorthorn, or Durham, one or two bulls of that breed having been introduced into this and the adjoining county of Clifton, from Kentucky; and certainly the stock is greatly improved. Common cows are worth from $25 to $40 each, while those half bred will bring from $50 to $100.

I am not aware that any half-bred cattle have been tried as working oxen in this section. Good common steers are worth from $70 to $80

the pair, at three years old; and the average price of fair oxen, is about $100 per yoke. Single animals are worth, at one year old, $15; at two years, from $20 to $25; and at three years, the same as cows.

Statement of SAMUEL D. MARTIN, *near Pine Grove, Clarke county, Kentucky.*

We have a great number of imported cattle and their descendants, in this and the adjoining counties. Our Shorthorn stock comes from the best blood known in the English Herd Book. The first cross of a Shorthorn upon an ordinary cow produces so decided an improvement, that the animal is worth about twice as much at any period of its life. Each succeeding cross adds to the value of the progeny.

The Shorthorn cattle are the best for milk and beef of any I have ever had. I have owned several cows, each of which would give over 30 quarts of milk a day, having an average of 10 per cent. of cream.

I have kept up the good milking qualities of my herd by breeding only from bulls descended from great milkers. But I believe the milking qualities are more certainly to be obtained from the mother than from the father. Many years ago, I purchased two cows of the Shorthorn stock; one was a constant milker, giving 32 quarts of milk daily; the other gave about two quarts daily. These cows were taken to the same bulls, the first produced fine milkers, without an exception. From the other, I did not get a cow that was worth anything, as a milker, until the fourth or fifth generation; and even then they were not good enough to induce me to keep the breed, and the whole race was sold to the butchers. But they were always fat, while the progeny of the first cow were invariably lean when in milk, but fattened quickly when dry. The steers from the first cow fattened as quickly as the steers from the second.

I always employ oxen on my farm, and have worked those of every breed we have among us. The Herefords are excellent workers, and pull evenly. But they are harder to break in, and are apt to be more vicious than the Shorthorns.

I prefer the Shorthorns for oxen, for the following reasons: They are gentle and docile, easily broken in and managed, strong, and true in pulling, are not vicious among other stock, and when they have worked five or six years, are easily fitted for the butcher, who will pay a good price for them. The objection that they get too fat to work is easily obviated by keeping them continually employed.

The ordinary cattle make good oxen, but do not possess near the power of the two breeds above mentioned. Still they have an advantage over heavier breeds in freezing weather, in not having their feet cut by the frozen ground. We never have our oxen shod. Plowing is generally better done by oxen than by horses. They plow deeper and more evenly.

Statement of ROBERT W. SCOTT, *of Locust Hill Farm, Franklin county Kentucky.*

I have been a breeder of Durham cattle for more than twenty years, and now have a respectable herd of them, of both sexes, and of various ages; and as I have found them, in all respects, well suited to the wants and condition of the Western farmer, I expect to continue to breed them as long as I live.

Statement of EDWARD F. GARLAND, *of Aroostook, (No.* 11, *range* 5,) *Aroostook county, Maine.*

Neat cattle have been much improved the last few years in this section. We have no full bloods, but crosses of several breeds. Very little corn is used in fattening; most of our beef is made from grass and root crops. Three-year-old steers are now worth $65 and $70 a pair. Cows are worth, in the fall, $18 and $20 each; in the spring, from $30 to $35.

Statement of HOWARD M. ATKINS, *of Mount Vernon, Kennebec county, Maine.*

The Durhams and Herefords, crossed with our common stock, are the standard cattle in this vicinity. The Ayrshires are beginning to be introduced, but not in sufficient numbers to allow of the forming of an opinion in regard to their capabilities for the yoke or the dairy. The Durhams or the Herefords, crossed with our common cattle, make excellent animals for both. The oxen are generally strong and well made, easily fattened, and make fine beef. The cows are usually kind and docile, good for milk and butter. It is a common thing for cow to make from 12 to 15 pounds of butter a week.

Statement of FRANCIS FULLER, *of Winthrop, Kennebec county, Maine.*

We have imported Durham, Hereford, and Ayrshire cattle; but grade Durhams have been the most used among us, and have given the best satisfaction for milk, flesh, and labor. Grade Herefords have also been tried, and found to be valuable for flesh as well as for work. The Devon, Ayrshire, and Jersey breeds have not yet been much tried.

The cost of raising a heifer to the age of two years, or the period she first gives milk, is about $15. The cost of a steer at that age would be about the same. A good cow, giving milk, is worth from $20 to $40. A yoke of steers, two years old, will sell from $40 to $60, according to beauty and size. Beef, with us, on the hoof, is worth from $5 to $6 per hundred.

Statement of Eusebius Weston, *of Bloomfield, Somerset county, Maine*

Stock-raising of all kinds, for several years past, has yielded to lumbering, but is now on the increase. The Herefords, Durhams, and Ayrshires have been introduced among us, and their crosses upon our common stock have succeeded well. Hereford cows are the best milkers of the imported breeds; but our ordinary cows are as good milkers as any. Cost of transportation to Boston about $2 a head. There is a demand for most of our cattle among the lumbermen.

Statement of William Bacon, *of Richmond, Berkshire county, Massachusetts.*

It is very common to meet fine Devons, approaching very nearly to the English models of this beautiful and serviceable breed. Probably from one-half to three-fourths of the neat cattle of this region are more or less tinctured with Devon blood. The common stock has been much improved by crosses of this breed.

Statement of C. F. Mallory, *of Romeo, Macomb county, Michigan.*

We have no full blooded imported cattle that I am aware of. Cost of raising till three years old, $5 a year. Expense of getting to market, about $3 a head.

Statement of J. D. Yerkes, *of Northville, Wayne county, Michigan.*

Our agricultural societies exhibit the gratifying evidence of a very decided improvement in our stock of cattle. The Durhams are the favorites of most farmers, although some prefer the Devons. For early maturity and excellent fattening qualities, the short horns are unrivalled. A cross of the Devons on our common stock produces well-formed animals, of medium size, and are almost invariably of a deep red color. For working oxen, they are readily matched, and combine muscular power with speed and activity.

Statement of C. E. Potter, *of Manchester, Hillsborough county, New Hampshire.*

Of cattle the "Durhams," or "Shorthorns," have been introduced, and the blood, pure or mixed, is diffused throughout the State. Wherever they are found they maintain their reputation, and are highly prized.

In the valley of the Merrimack, pure "Devons" are more generally bred than any other blooded stock; but I am inclined to the opinion that they are becoming of less repute than formerly. They are handsome, fine-limbed animals, of a "taking" color, of an easy, swift movement, and "answer" well upon light, level lands; but in our hilly, mountainous region, their size forbids their making suitable oxen

for work, and from being profitable for the shambles. So that, aside from their capacity as milkers, which is a mooted point, their usefulness for labor, and their value for beef, the Devons must fall behind several other breeds. When crossed, however, with our "common cattle," an improvement, perhaps, may be obtained upon the color and activity of the one, and on the size and weight of the other. Yet for working cattle only, it will be hard to improve upon the descendants of our original sort; for certainly, our oxen now, in docility and capacity for labor, are equal, if not superior, to those of any country on the globe.

Live cattle, upon an average, can be transported from this State to the Cambridge market, near Boston, for $1 50 per head.

Statement of A. G. Comings, *of Mason, Hillsborough county, New Hampshire.*

The Ayrshire and Devon cattle have been introduced, to some extent, into this county. The Ayrshires, with plenty of sweet food, recommend themselves well. Our farmers, however, pay comparatively little attention to the cultivation of the sweet grasses, clover, &c.

The Devons readily appropriate the sour grasses to their support. They do well upon meadow hay, and grow finely in our old, sour pastures. They are gentle under the yoke, and approved for various other good qualities. Hence they are fast gaining favor with us. They receive flesh and fat with sufficient readiness to prepare them for resisting the severity of our climate. Governor Steele, of this State, has assured me that some of his young cattle of ordinary breed cost him nearly twice as much to keep through the winter as his Devons of the same age. It is evident that these advantages are the consequence of constitutional peculiarities which the Devons possess, and which particularly adapts them to our soil and climate.

In fattening some oxen, a year since, I made an attempt to produce ox beef which should be in tenderness, sweetness, &c., equal to the finest beef produced from young cattle. To do this, I supplied them with what would most rapidly form lean flesh, and kept them from any exercise, which would harden the muscles. At the same time, they were fed with corn, to produce fat. They had also the best turnips, with cabbages, sugar beets, beans, &c., and hay. They were two oxen, and the result was the same in both instances, the production of beef of the most delicious sweetness, finely streaked throughout with fat and lean, and of the utmost tenderness. I have never seen it surpassed, and yet it was produced without extra expense.

Statement of Norman H. Allen, *of Persia, near Gowanda, Cattaraugus county, New York.*

Neat cattle, in this county, are raised to a considerable extent. English or blooded animals are worth from 10 to 50 per cent. more than our common stock, and cost but a little more for raising, except the first year.

Common cows are worth from $25 to $40; grade Durhams from $30 to $80 each in spring, and from $10 to $15 less in the fall.

Statement of LORENZO ROUSE, *of Paris Hill, Oneida county, New York.*

The rearing of cattle for market, except improved breeds, is not generally considered profitable in our county. Durhams and Devons are bred to some extent among us, and with considerable success, being sold at a profit to those who purchase for the purpose of improving their stock; but horned cattle are not raised very extensively for market. Many are fed in this portion of the county; but our farmers who turn their attention to this branch of business find that they can usually purchase steers three or four years of age at a cheaper price than they can afford to raise them. The cost of raising a steer till three years old would usually be about $25 to $30, but they are generally obtained by picking them up singly about the country, or by purchasing from droves, which come annually from the West, usually from Ohio. Some of our farmers find a profit in stall-feeding their cattle in the winter, thereby not only making a home market for their root and grain crops, but greatly increasing their supply of manure. Success in either case will depend, as a matter of course, in a great degree on judgment in purchasing, skill in feeding, and frequently on luck in marketing.

Our store cattle are principally crosses of the improved breeds, and consist mainly of cows kept for domestic use, or for the purposes of the dairy. These are of such a mixed breed that it would be hardly possible to determine what blood predominates. Crosses between the Durhams and our common stock are thought by many to make the best milkers; while others consider a cross with the Devons fully equal, if not preferable. Cases are by no means rare in which cows of what is usually termed the "native breed" are found equally as good milkers as any among the various kinds of imported stock. This remark may not be equally true, however, in regard to their aptness to take on fat, when it is found advisable to fit them for the shambles.

Statement of S. A. COLLINS, *of Sodus, Wayne county, New York.*

This county has not heretofore been a stock-raising region. Wheat and other grains have been the principal crops; but the "insect" and weevil have become so destructive to our wheat that more attention than formerly is given to raising domestic animals. A few cattle are sent to the Eastern market. The cost of raising cattle till three years old is not far from $25 a head; at that age they bring from $25 to $50. Cost of transportation to New York from $4 to $6 a head.

We prefer the Devons to any other breed; they are hardy and easily kept. The oxen are quick, active and docile, and the cows are excellent milkers, averaging two pounds of butter a day each, with good eed.

Statement of S. S. G. Franklin, *of Cuba, Clinton county, Ohio.*

A few good cattle are raised in this county. The first crosses of the Durhams with our common stock are considered best for beef.

The cost of raising a steer three years old is $24, or $8 a year. A good pair at that age will bring from $50 to $90. Milch cows are worth from $25 to $50 each.

Statement of Elias Green, *of Wakeman, Huron county, Ohio.*

Much attention is given to the raising of stock by our farmers; and some fine animals have lately been introduced for the improvement of our common breed. Calves, during the first winter, should have careful attention. My practice is to give them fresh feed through the fall, with salt regularly, in order to have them fat, if possible, at the commencement of winter. To prevent their wasting hay, I make a box say 16 feet in length, 3 feet in width, and 18 inches in depth, with a rib running lengthwise over the top, to prevent their getting into it. Such a box will accommodate 20 calves.

Statement of C. Jacobs, *of Dayton, Yam Hill county, Oregon.*

Cattle are raised here in great numbers, both the imported English and their crosses with the Spanish breeds.

For milking qualities the pure English bloods are preferred; for beef no choice is made; for working oxen preference is given to the crosses, as being more sprightly and nervous. The cost of raising cattle is only trifling, because it is seldom that they have to be provided with food during the whole winter. The price of cows at the present time varies from $40 to $60 each. Working oxen bring from $100 to $125 a pair.

Statement of George Buchanan, Samuel Gilliland, James T. Hale, David Duncan, *and* William P. Fisher, *being that portion of their report which relates to cattle, addressed to the Centre County Agricultural Society of Pennsylvania.*

The great majority of cattle in this county are of the common stock, small in size, and without any particular quality to recommend them; yet, while deficient in form, there are some excellent milch cows among them. With proper care good dairies can be selected.

The Durham and other improved breeds are far superior in point of symmetry, which increases their value greatly when taken to the shambles, and their milking qualities are not to be surpassed by any in the country. If we had the breeds established or improved, the raising of cattle for the shambles would be a profitable business; but, owing to the carelessness of most of our farmers in the selection of their breeding animals, there is nothing more than the shadow of an improvement made yet. This carelessness, in a great measure, is attributable to the looseness of our laws, in giving the citizens a privilege to turn their "scrub

bulls" into the public highway, to roam at large, to the injury of their neighbors.

Statement of ZENO P. WHARTON, *of Egypt, Wharton county, Texas.*

We have no breeds of cattle, except the Mexican stock, which the Americans found in the country when they first came here. The oxen are of large size, and make good teams. The cows are good milkers. The beef of these cattle is very excellent. The cost of raising cattle on our prairies is almost nothing. At three years old they are worth $12 a head; at five years old $16. Cost of driving to the Gulf markets, $1 50 a head.

A few Durham bulls were brought into this vicinity from the Western States. But, from the abundance of food, they soon became so large and strong as to be dangerous to our herds, and were, consequently, shot. Therefore we had not an opportunity of ascertaining the results of a cross upon our common stock.

Statement of WILLIAM SMOOT, *of Boone Court House, Virginia.*

I am of the opinion that the Durhams crossed with our "scrub cattle," are far better for this mountainous region than the full bloods. There is but little grazing done here on enclosed ground, the stock-raisers herd their cattle amidst their mountainous range.

Statement of DR. HENRY M. PRICE, *of Nicholas Court House, Virginia.*

The cattle of this county usually are sold to the "valley farmers," to be fattened for market, at four years old. The cost of raising to this age is about $2 or $3 a year. They sell for from $18 to $22 each. Cows are worth from $20 to $25.

DAIRIES.

CONDENSED CORRESPONDENCE.

Statement of EDWARD F. GARLAND, *of Aroostook, (No. 11, range 5,) Aroostook county, Maine.*

But little attention has hitherto been paid to the dairy. Increased interest, however, is now beginning to be manifested, as we have a good market for all its products. Cheese is made during the hot summer months, and butter during the rest of the year. The average product is about 100 pounds of cheese, and 150 pounds of butter to each cow. Average price of butter 20 cents a pound; of cheese 12½ cents.

Statement of Francis Fuller, *of Winthrop, Kennebec county, Maine.*

Butter, at present, owing to the drought, sells with us from 20 to 25 cents per pound, which would be profitable to the farmer; but, in ordinary seasons, it is worth only from 12½ to 17 cents. Cheese, at present, sells with us for 10 to 12½ cents per pound.

Statement of Norman H. Allen, *of Persia, near Gowanda, Cattaraugus county, New York.*

A good cow in this region will produce 150 pounds of butter, and from 350 to 400 pounds of cheese a year. The present price of butter is from 15 to 20 cents per pound; of cheese from 7 to 10 cents.

Statement of Josiah Southwick, *of Evans, Erie county, New York, showing the number of quarts of milk given by six cows during the year* 1854.

Cows.	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.
January	92	40	68	166	54	....
February	48	6	8	90	250	....
March	....	....	....	35	205	....
April	195	55	80	156	210	140
May	300	362	362	362	256	260
June	364	390	400	390	290	300
July	310	320	330	340	290	280
August	290	228	290	350	228	228
September	200	190	220	266	220	210
October	200	183	215	240	205	215
November	185	100	175	205	144	144
December	150	80	150	165	120	125
Total	2,334	1,954	2,298	2,765	2,472	1,902
Value	$43 00	$34 30	$41 09	$51 49	$46 19	$34 46

The milk was sold at our railroad station for just one-half the retail price in Buffalo; so that the value in that city would have been double the sum given above. The price varied in different seasons of the year. In Buffalo, during January and December, it was 5 cents a quart; during May, June, and July, 3 cents; and during the remaining months 4 cents a quart.

Statement of Lorenzo Rouse, *of Paris Hill, Oneida county, New York.*

Dairies in this vicinity comprise from ten to fifty cows each. The average product may be estimated at 120 pounds of butter, or 250 to 275 pounds of cheese to a cow. The business has been uniformly good for several years, and nearly all our farmers are engaged in it to some extent; some in connexion with other branches of agriculture, and others to the exclusion of nearly everything else. This was once a

great wool-growing county, but as our flocks of sheep have diminished, the number of cows has increased in proportion. The ruling price for butter through the season has been about 20 cents, and cheese 8½ cents per pound.

Statement of RALEIGH W. DYER, *of Prillaman's, Franklin county, Virginia.*

Butter is not produced in large quantities in this section, nor is it so rich and good as it should be, because but little pasturage has yet been provided for our cattle, as the natural range of country suitable for grazing is now nearly exhausted. Our farmers, however, are beginning to turn their attention to this subject. The cost of producing butter is about 7 cents a pound. It is worth in market from 12½ to 19 cents per pound, according to quality.

Statement of DR. HENRY M. PRICE, *of Nicholas Court House, Virginia.*

The cows in this region average about 8 quarts of milk a day. Fine samples of butter are made, which sell from 10 to 12½ cents a pound, of an excellent quality. Cheee is worth from 8 to 10 cents.

HORSES, ASSES, AND MULES.

CONDENSED CORRESPONDENCE.

Statement of J. H. FORMAN, *of Oak Bowery, Chambers county, Alabama.*

The animals affording the most profit to the stock-raiser in this section are horses, mules, swine, &c., neat cattle and sheep being less profitable than cotton. Horses and mules can be raised to three years old at an expense of $35, and will then sell at $100 each.

Our horses are derived from the Four-mile racers, but have vastly degenerated, besides being deficient in bone, for the correction of which there has recently been a considerable importation from Canada of a breed obtained from a cross between the Canadian and the old Norman horses. Although time has not fully developed the results of this cross upon our own stock, we feel justified, from present appearances of the progeny, to indulge favorable hopes of improvement. It has frequently been urged that mules consume less food than horses. I have failed to discover the difference, but am satisfied that animals of both classes of equal size, and performing the same labor, require the same amount of food. Nor have I discovered, during an observation of 25 years, that horses properly treated are more subject to disease than mules. I maintain that the opposite opinion, which is so prevalent, has resulted from a want of attention to the difference in their dispositions. The horse, being excitable and suspicious, is easily urged to a most ruinous amount

of exertion, especially as to speed; but the mule, being calm and pertinacious, is frequently able to resist all the stimulants to over exertion, and thus accommodate his labor to his capacity. Hence, the disposition of the horse adapts him to emergencies requiring speed, while that of the mule, properly trained, favors longevity and heavy drafts. Their early education requires the same management, namely: kindness, familiarity, and firmness. The same treatment that overcomes the suspicion and irritability of the horse disarms the obduracy of the mule. The term "breaking" is a misnomer, as applied to them, as it implies a destruction of vitality and energy, which is an irretrievable loss. He must not be broken, but inured to labor, and this so gradually that he will hardly know where pastime ends and labor begins. Very few horses or mules which have been broken are reliable in emergencies, and many are injured for life by the operation.

Brood mares may be moderately worked, when not suckling or very heavy, without detriment. They require the different changes of diet which the product of the several seasons provide and suggest, and a shelter from all inclement weather. At all other times open air is best.

Statement of ANDERSON GORDON, *of Lewisburg, Conway county, Arkansas.*

Horses are raised here, at a cost of from $30 to $40 each at the age of three or four years. Cost of transportation to New Orleans, from $6 to $10 a head. They are worth in that market from $75 to $125 each.

We also raise some mules, which are our most serviceable animals. They cost from $25 to $40 a head when three or four years old, and sell in New Orleans for from $50 to $150 each.

Statement of E. BABCOCK, *of Riley, McHenry county, Illinois.*

Nearly every farmer with us keeps from two to six horses; yet this class of stock is very scarce, and commands a high price. Good farm horses are worth from $200 to $300 a pair.

Statement of MARTIN MONDY, *of Vermilion county, Illinois.*

The raising of horses and mules receives considerable attention in this section. The cost of raising, till three years old, is about $25. At that age they sell for from $75 to $130 a head.

Statement of JOSEPH C. ORTH, *of McCleary's Bluff, Wabash county, Illinois.*

The cost of raising horses to three years old is various. Many farmers raise them at a cost of less than $10 a year, depending upon wild pastures for food during the summer and nearly all the winter; while others, who feed in the stable almost exclusively, raise them at a

cost of from $20 to $30 a year. I have no means of stating the cost of transportation to an Eastern or Southern market.

We have but few horses except the common breeds, and their value for labor is, of course, variable, often according to the manner in which they have been reared. I do not know of any imported or blood animals.

The cost of raising mules is still less than that of horses, and is governed by the same rule. At two years old, mules are generally considered capable of performing labor. Until within a few years but few could be found in our county. But a trial in raising them has shown that they are perhaps more profitable than any other kind of stock, eating less than the horse, and able to sustain themselves better upon wild pasture, as well as coming into market much sooner, one year at least, than the horse. A good mule, two or three years old, commands from $100 to $125.

Statement of A. J. Boone, *of Lebanon, Boone county, Indiana.*

Horses, at four or five years old, ordinarily sell for $75 to $125, and sometimes as high as $150, owing to the size and character and to the training of the animal, as well as the use for which they are desired. They are usually taken to Pennsylvania, Kentucky, and Illinois.

Mules, at weaning time, sell for $30 to $40, and at two years old for $50 to $75. They are taken to Kentucky, and thence southward.

Statement of H. F. Moore, *of Big Mound, Lee county, Iowa.*

Mules, in this section, are the most profitable stock that we can raise. The average price of colts at six months old is $45; at two years $90; at three years $120 each.

Statement of Hugh M. Thomson, *near Davenport, Scott county, Iowa.*

Horses, with us, are as yet only raised for the home market. They are worth, at three years old, from $75 to $125 each, according to quality. Average value, $100. At five or six years old they are worth about one-sixth more than at three years. Value at one year old, $50; at two years, $75; and the cost of rearing to three years old, from $30 to $40. There are a very few pure bred animals in this part of the country, although we have many very valuable ones. The present high prices are drawing the attention of breeders to better and finer stock.

Good mules are worth a little more than horses, and, in most cases, can be raised at less expense.

Statement of Edward F. Garland, *of Aroostook,* (*No.* 11, *range* 5,) *Aroostook county, Maine.*

The breeding of horses is considerably attended to, and is thought

profitable by our farmers. Most of the farm labor is done by them. The price of horses varies from $75 to $200 each.

Statement of FRANCIS FULLER, *of Winthrop, Kennebec county, Maine.*

The "Messenger" breed of horses has been much reared with us, and stands in high estimation among our farmers.

Colts at four months old, or weaning time, are worth from $20 to $25; at three years of age, from $70 to $100. They are a very uncertain animal to raise, being subject to more diseases and casualties than any other farm stock.

Statement of J. D. YERKES, *of Northville, Wayne county, Michigan.*

The rearing of good horses has always been regarded by us as profitable, although but few have been raised for exportation. The high prices obtained for horses during the last two years, however, have induced farmers to engage more extensively in raising them. Our horses are crosses of the "Messenger," "Duroc," and some other bloods upon our common stock, and are well suited either for farming purposes or the carriage.

The cost of raising a colt until four years old, all expenses included, is not far from $70. Its value at that age is from $130 to $150. Cost of transportation to New York by steamboat and railroad about $20.

Statement of H. L. BROWN, *of Fayette, Howard county, Missouri.*

Mules can be raised at a better profit than any other animal in this section. This arises from several causes: They are at any time readily disposed of in lots, at fair remunerating prices. Besides, their great powers of endurance, almost entire exemption from all diseases, uniform longevity, and early maturity on little and inferior food, combine to render them profitable and desirable stock. Price of a colt five months old, from $40 to $100; average, $50. Cost of raising till three years old, $30. At that age they are worth $110 each.

Statement of C. E. POTTER, *of Manchester, Hillsborough county, New Hampshire.*

Of horses, the "Black Hawk" and "Morgan" breeds are generally sought after and raised in this State, whenever preference is given to any particular sort. Among them there are excellent roadsters, the friends of both claiming superiority. Although the "Black Hawks," perhaps, may be the fleetest; take them for "all work," the "Morgans" are the best stock for New England. They are intelligent compact in form, yet graceful in their movement, spirited in action, full of nerve, remarkably tractable, but not viciously inclined; in one word, the "Morgan" is just the horse for the gentleman or farmer, who, of

necessity, needs an animal fitted for the road or farm, a doer of all kinds of light labor, and occasionally put to a heavier draught.

A colt at four years old costs, in this section, $100; and at that age oftener brings less than this amount than more.

Statement of NORMAN H. ALLEN, *of Persia, near Gowanda, Cattaraugus county, New York.*

But little attention is paid to raising horses in this county. It costs about $10 to keep a colt the first year; $15 for the second; and $20 for the third. A colt at four months old will sell from $15 to $25; at sixteen months, from $20 to $40; at two years, from $30 to $60; and at three years, from $50 to $100. A pair of good, well matched horses, at six years old, will sell from $200 to $500.

Statement of PETER REID, *Lake Post Office, Greenwich, Washington county, New York.*

The raising of horses in this county is rapidly advancing, and is attended with marked success. The "Morgan" and "Black Hawk" breeds are the general favorites.

Statement of S. A. COLLINS, *of Sodus, Wayne county, New York.*

We have some fair horses of the "Morgan" blood. Colts at three years of age are worth from $75 to $125, according to quality. Cost of raising till three years old, not far from $40. Our horses, I think, are improving from year to year.

Statement of D. C. M. EVANS, *of Scio, Harrison county, Ohio.*

The present high prices obtained for horses have induced many to engage in raising them. A good four-year-old horse brings from $120 to $160. The expense of driving them to the Atlantic markets is about $10 a head. The cost of raising till four years old, $60.

Statement of C. JACOBS, *of Dayton, Yam Hill county, Oregon.*

Until within a few years past no effort was made to improve our ordinary, or Spanish horse. Now, however, we are not only improving the race, but have introduced the pure American or English breeds. The cost of raising the latter till three years old varies from $20 to $40 a head. At that age they bring, in market, from $100 to $150 each. The cost of raising the crosses of the American and Spanish bloods is less by one-half than that of the pure bloods, because the mothers are allowed to run at large upon the wild pasture lands, and but little attention is paid to the colts till the season arrives for "haltering" and taming, that is, at the age of three years. They are then sold, principally for farm use, at from $60 to $80 each.

Statement of George Buchanan, Samuel Gilliland, James T. Hale, David Duncan, *and* William P. Fisher, *being that portion of their report which relates to horses, addressed to the Centre County Agricultural Society of Pennsylvania.*

Of late years the raising of good horses is regarded by us as a profitable business. Colts at six months old will bring $40, and if they are very large and well proportioned they will sell for $50 or $60. The cost of raising until six months old does not exceed $15. When they arrive at the age of three years their cost is not more than $60, and the average value at that age is not less than $100, when they are strong enough to pay for their keeping by labor. At five or six years of age a medium-sized draught horse is worth $130, and if extra large he will command a much higher price. The horses used here for mining purposes are nearly all of heavy draught, and are much sought after by the drovers from the East.

Mules are not raised here, and are seldom used, except about iron works, where they are found to answer better than horses. They will stand harder treatment and coarser fare. They are mostly brought from Kentucky, and command as high prices as horses.

Statement of Zeno P. Walker, *of Egypt, Wharton county, Texas.*

This is not a favorable region, in my opinion, for raising blooded horses. This may be on account of the mode of treatment. But I believe it requires a more elevated region and a dryer atmosphere than are afforded by our coast to give them a vigorous constitution. They are subject to the "Spanish fever," from the effects of which they seldom entirely recover.

Statement of William Smoot, *of Boone Court House, Virginia.*

Of all the animals we have, the mule would be the most profitable, if our farmers would turn their attention to rearing these animals. There are a few raised in the county of Kanawha, worth from $50 to $75 each, at from twelve to eighteen months old. It costs no more to raise a mule than a steer, and the former will bring three times as much as the latter at the same age.

Statement of Dr. Henry M. Price, *of Nicholas Court House, Virginia.*

A good many horses of a fine quality are raised here for market. Those known as the "Greenbrier" breed are regarded as the best. Cost of raising to four years old about $50 each. They sell from $90 to $150.

Mules are more profitable than horses. Cost of raising to two years old about $12 each. They are worth from $60 to $100 each.

SHEEP AND WOOL.

HISTORY AND MANAGEMENT OF MERINO SHEEP.

BY GEO. CAMPBELL, OF WESTMINSTER WEST, WINDHAM COUNTY, VT.

The introduction of Merino sheep into the United States formed an era from which we may date much of our present thrift and prosperity. Chancellor Livingston, of New York, foresaw at an early day the immense advantages that would result to our country from their introduction, and to him belongs the honor of one of the earlier importations. In his "Essay on Sheep," published in 1809, he says: "I shall not envy the glory of the Argonauts if I can successfully plant the Merinos of Spain in my native land." A little time subsequent Colonel Humphry sent a small flock from Spain to Connecticut; but to the Hon. Wm. Jarvis, the farmers of Vermont are mainly indebted for his invaluable importations, and I will hazard nothing in saying that no foreign minister nor other agent has ever been instrumental in accomplishing so much good to the country as did Mr. Jarvis in his consular mission to Spain.

Future Prospects of Wool-growing in Vermont.—The number of sheep in our State has been diminishing for several years. The low and fluctuating price of wool has contributed to bring about this result. Under the impression that the great West would produce wool to such an extent as would depress the price so low that competition would be impossible, many of our farmers prematurely disposed of their flocks; but the present high prices of sheep and wool show conclusively that the former depression was not mainly in consequence of an increased production in our Western States, other causes having contributed to that result. The rapid increase of our population, the increased demand for wool and woolen goods, so indispensably necessary to the health and comfort of the inhabitants in all parts of our country, and the increase of our woolen manufactories, will all contribute to increase the future demand. The West and South will continue to increase in the production of wool, and we may and should expect that it will come in competition with the wool produced in the older States; but whoever understands the genius of the inhabitants of our trans-Alleghany States, and knows how difficult it is to introduce a new branch of husbandry, even admitting that the soil and climate are as favorable for the production of fine wool, will see that ruinous competition from this source is yet a long way in the future. Again, it should be remembered, in connexion with the prospective demand and supply of wool, that on the continent of Europe almost universally its production has been at its maximum, and in future must be on the decline. With a favorable climate and grazing facilities peculiarly adapted to the purpose, if our farmers cannot grow fine wool profitably I would ask what can they grow? Surely in the production of beef, pork, and grain we shall not be less liable to competition from our Western neighbors. Another consideration should have its due weight with the wool-

growers of our State. It will be conceded, I think, that the Merino has attained a higher degree of perfection in this than in any of our sister States. Indeed, I verily believe our best bred flocks are improved from the original importations from Spain. Soil, climate, and skill in breeding have all contributed towards giving us a wide reputation for our superior sheep. The long cold winters incident to our State, which are considered the main objection to the profitable production of wool, may, I imagine, give us an advantage over our competitors in a milder climate. The natural law in the animal economy that the covering of an animal will adapt itself to the temperature of the region where it resides will undoubtedly hold true in this case. The thick heavy-wooled Merino of Vermont, bred in a more southern latitude, will gradually diminish its now unnecessary coverings, and the offspring, after a few generations, will exhibit those desirable points in a less marked degree. Hence, in the future, as now, we may confidently rely upon a market for our surplus stock for breeding purposes at remunerating prices. Impressed with these views of the subject, we may anticipate for a long series of years a good degree of prosperity for the wool-growers of our State.

The Race of Sheep best adapted to Wool-growing.—For the profitable production of wool, the Merinos stand pre-eminent. Their superiority on this point, over the common and English breeds among us, requires no argument. The so-called "Saxony sheep," although belonging to the Merino family, from the delicacy of their organization, and lightness of fleece, are not well suited to our climate. There are three varieties of the Merino now bred in our State, namely: *Spanish*, *French*, and *Silesian*, and the respective claims of each to precedence are not yet fully settled. They are all the descendants of the Merinos of Spain, having been removed from that country at a period when their flocks were in the highest degree of perfection. At that time there were several families known as the "Paular," "Infantado," "Negreti," "Escurial," "Montarco," &c., each differing in many prominent points, but all possessing valuable fleeces. These sub-varieties, with few exceptions, have been amalgamated, both in this country and in France. The Spanish Merinos, or more properly the *American* Merinos, as they now exist, are the descendants of the importations of Mr. Jarvis and others, and have been bred in this country upwards of forty years; and it is a matter of deep regret that so few of these truly valuable animals have been preserved in a pure state. At one time, in consequence of crossing with the Saxons, and gross carelessness in breeding, the pure Merino blood became almost extinct; but fortunately for the country generally, and particularly fortunate for those whose foresight enabled them to estimate the future demand, a few flocks of these sheep have been preserved from the general ruin of their purity. In speaking of the comparative merits of the several varieties, let it be understood that reference will be had only to the best bred flocks under consideration. Their points of excellence are too well known to need a particular description at this time.

History of the French Merinos.—This variety, originally from Spain, was exported from thence some twenty-five years prior to the period of their introduction into the United States, under the patronage of

Louis XVI. By permission of the king, four hundred rams and ewes were selected from the finest flocks in Spain, and arrived in France in 1786. These consisted of the several sub-varieties, before referred to, and their amalgamation formed the basis from which have originated the French sheep recently imported into this country. Their purity of blood will not be questioned by those conversant with their subsequent history. Nearly seventy years have elapsed since their introduction into France, and they now form a distinct variety, differing materially from the original stock, showing in a remarkable degree the change which skilful breeders can effect in the organization of domestic animals. Their size and weight of fleece have nearly doubled; they are more docile, and less inclined to range over a wide territory; their propensity to fatten is increased, and in fact, they are more completely domesticated than their ancestors. The following description is given by a gentleman who has had considerable experience in breeding them: "These sheep are of unusual size, and possess, to a remarkable degree, the qualities desirable in sheep for mutton and wool-growing purposes. They are completely covered with a long, thick, and fine staple of wool. Many of these sheep are encircled with large folds of loose skin around their necks and shoulders, giving a greater surface for the growth of wool. They have strong and hardy constitutions, are very prolific, and as the ewes are excellent nurses, there is no difficulty in raising their lambs."

From a careful examination of this variety in France, and from several years' experience in breeding them in this country, I feel confident in the conclusion that they will prove a valuable acquisition. It is believed that they will yield a greater profit in wool and mutton combined, than the coarse-wooled English breeds, and that they will ultimately be substituted for them. The fact, however, should not be concealed that, in some cases where rams of this class have been crossed with the old stock of Spanish ewes, the offspring have not, in all respects, proved satisfactory; and in some cases the full-blooded imported stock has not come up to the high expectations of the purchaser. From this cause, in part, a prejudice exists, to some extent, against this variety. The seller, influenced from motives of pecuniary gain, has, undoubtedly, in many cases, greatly over estimated their good qualities, and the buyer has formed a higher opinion of their wool-growing capacities than could reasonably be expected from anything belonging to the ovine race. Let it be remembered that the larger breeds of domestic animals require more liberal feeding; that their good proportions will not be so perfectly developed upon short pastures and scanty winter-feeding as those of a smaller, or medium size. It should also be remembered that these sheep, previous to their importation into this country, received liberal feeding, and had been under the watchful care of the shepherd and his dog, and are, consequently, less qualified than our naturalized breeds to seek their subsistence over a wide range of short pasture. These circumstances will explain, in most cases, the cause of disappointment. The farmer who is favorably situated for the sale of mutton, and can furnish good summer pasture and liberal winter feeding, will find this variety of the Merino

valuable, and will realize, in the form of a valuable fleece and a large carcass, a handsome return for the fodder consumed.

History of the Silesian Merinos.—These are of a more recent importation, and are less known to the public than any of the three varieties. The first importation of this kind reached New York in May, 1851, and was personally selected by the writer, with whom was associated, as a partner, William Chamberlain, of New York. Like the other Merinos, originally from Spain, they were exported from thence into Germany, in 1811, since which time they have been in the care of a most skilful breeder, who is also a gentleman of high scientific attainments, but ardently devoted to the improvement of his flocks. Unlike most of the German breeders, he has avoided the error of sacrificing all other considerations to the quality of the staple. The sheep of the German States generally are of the Saxon variety of the Merino, and would not meet with countenance from the wool-growers of New England.

The flock in question was bred purely from the Infantado Negreti family, of which fact the gentleman was able to furnish us with undoubted evidence; and it is confidently believed that another pure bred Negreti flock does not exist. They presented to the observer that uniformity of appearance and sameness which is a *prima-facie* evidence of purity of blood and skill in breeding. After satisfactory examination, I am confident in the conclusion that selections from this flock would supply an existing want, and prove acceptable to a large class of wool-growers in our own country. Subsequent events have justified the correctness of the conclusion, and additional shipments have been necessary to supply the demand.

The ewes of this variety are nearly faultless in shape; the rams are less perfect in this respect previous to maturity. They are thickly covered with a compact and exceeding fine growth of wool, holding its evenness and thickness over the entire pelt in a remarkable degree; are of a medium size, the ewes weighing at maturity from 80 to 100 pounds, and the rams from 100 to 150 pounds. The weight of fleece is about the same as the best Spanish flocks, but the length of staple is not quite so long, but more compact. The natural oil is sufficiently abundant to give them the desirable dark surface, but, unlike some of the Spanish, it is wholly removed by washing in cold water. The offspring resulting from the union of these rams with the common Spanish ewes have proved more than satisfactory to those who have made the cross, the quantity of wool having been considerably increased, and the quality much improved from the original stock.

In concluding this description, the facts will warrant me in saying that, as to purity of blood, they stand pre-eminent. The other two varieties, although of pure Merino blood, are yet the offspring resulting from a union of the sub-varieties before referred to. For the profitable production of the finest grade of wool, the Silesians are unequalled. But, it may be asked, which of these varieties, all things considered, are the best adapted to the mass of wool-growers? The question does not admit of a direct answer. The individual circumstances of each farmer must be taken into the account, and his location, conveniences for keeping a large or small number, and the nature of his pastures, must have their due weight in deciding the question.

The Size of Sheep best adapted to Wool-growing.—Size, in itself, within certain limits, is not a matter of so much importance. It is conceded that animals of the same species require at maturity an amount of food in proportion to their live weight. This doctrine needs confirmation. I apprehend numerous exceptions would be found to exist. The object of the wool-grower is to breed that size which will yield the most profit from a given amount of fodder. Without any positive evidence, it would be reasonable to suppose that two sheep weighing 100 pounds each, would produce more wool than one of 200 pounds, and that the two would also consume more fodder. A diminutive size should be avoided, as indicative of a defective constitution, and the lambs of such, being delicate, are raised with more difficulty. The size best adapted to the majority of farmers of this State should not vary much from 100 pounds when in good condition.

Proper Course of Breeding.—Our best breeds of domestic animals owe their existence solely to a long system of judicious breeding. The origin of the Merino sheep is not definitely known, and it will be sufficient for our present purpose to say that it now has hardly a shade of resemblance to its former type. This entire change in its organization is the result of care and attention, or, in other words, a proper course of breeding. The most perfect specimens, if left entirely to themselves, would undoubtedly, in a great measure, regain their former characteristics after a lapse of years, provided they could survive the transition. Let this fact be impressed upon the mind, that a judicious system of breeding is an incessant contest with the natural tendency of the animal to regain its former type. Under this view of the subject, it will readily be comprehended how soon the improvement effected in a long life of skilful management may be mainly lost by a few years inattention and neglect.

In order to effect a real improvement in a breed of sheep, it requires on the part of the breeder years of patient effort and close attention, with a fixed purpose to accomplish the end in view; and, in addition to this, let him cultivate, if he does not already possess, an absorbing attention to his flocks. Are his sheep coarse wooled? Are they light shearers? Are they under size? Are they defective in form and wanting in natural oil? The skilful breeder will be able to remedy these defects even without going out of his own flocks; but this, in all cases, will require too long a time, and hence, in most cases, he will find it for his own interest to borrow some improvements from his neighbor's flocks. The farmer who has now an indifferent flock, or who is about to commence the business of wool-growing, will not be able, in most instances, to incur the expense of procuring a flock of thorough bred ewes, unless he can rely mainly upon the sale of the offspring for breeding purposes. The great majority of farmers depend upon the wool and carcass for their profits. Hence it will be desirable to start with a good stock of ewes, which may be purchased at such prices as the profit of wool will warrant him in paying. The improvement which he will now be able to effect upon them will depend in a great measure upon the judicious choice of males. Weight of fleece, fineness of staple, combined with a good shape and vigorous constitution, are points which are indispensable in a thorough-bred flock. The selection

of males should be made from none but thorough-bred flocks, such as have maintained for a series of years a fixed character for evenness, fineness, and weight of fleece, and uniformity of shape. However we may regard the pride of a noble ancestry in the human species, it is certainly excusable in the breeding of domestic animals. The male himself should possess a high degree of constitutional vigor, a bright, lively, intelligent countenance, and should have a good share of what in the human species is called force of character. Such animals, I apprehend, are more likely to transmit their own peculiarities to their offspring. There should not be too great a difference in the size of the sire and dam. If the ewes are under size it will be desirable to use a ram the offspring of which would be somewhat larger than the original stock. The coupling of very large rams with small ewes is contrary to the laws of nature, and the progeny will not generally be satisfactory. If the selection of the ram has been judicious, the first lot of lambs will indicate a good degree of improvement. Let the most perfect lambs be reserved for breeding, and the defective ones be discarded. This elective or "training-up" process should be rigidly followed up in the succeeding generations. If the selection of the ram has been injudicious, and the lambs are defective in the points essential for good sheep, he should be at once rejected. No farmer can afford to breed from such an animal. The breeder who has already made considerable improvement, or has a thorough-bred flock, should by all means make a test before using any ram with his whole flock. A few ewes should be served by him, and if the offspring prove satisfactory, or otherwise, he will be able to determine upon the propriety of making further use of him. Ewes possessing any defect should not be served by rams having the same fault. Hence it will be found advisable to have several rams, in order to make desirable crosses, as even in the most thorough-bred flocks there will exist a slight difference in shape, quality, length of wool, &c.

The management of rams during the tupping season is a matter of importance. The majority of wool-growers are greatly in fault upon this point. The practice of allowing rams to run at large with ewes has generally prevailed, and in many instances he receives no additional feed aside from the rest of the flock. When the number of ewes to be served is small this practice is not so objectionable, but in large flocks it is absolutely essential to success, that a different course of management be adopted; but a matter of more vital importance is that he should be managed in such a manner as to keep his procreative organs in a vigorous state. If allowed to run at large with the flock, even if fed with grain in such a manner as to keep up a good degree of flesh and muscular strength, the too frequent and useless copulative act will assuredly induce a debility of the genital organs, the result of which will be a feeble offspring, and the valuable points in the male will be less liable to be transmitted to the young. He should not be too fat; for this condition, like the other extreme, will impair his capacity for service, and is often the occasion of incompetency.

The amount of service which rams will be able to perform cannot be definitely stated, as some will perform double that of others. The old Spanish rule was to allow four rams to one hundred ewes. The

German breeders usually allow one to about thirty ewes, and let them run at large. The following plan will enable the breeder to husband the resources of the ram, and he will thus be able to beget a much larger number of lambs: Let him be kept in some suitable pen in the sheepfold, by himself, or if uneasy, place him with a tame wether or ewe. The ewes should be brought into the fold every day, and a "teaser" should be employed to find those ready for service. As fast as they are found, they should be put into a pen by themselves, which should previously be prepared for the purpose. After selecting all that are ready for service, the balance of the flock should be taken away. This being done, the ram should be allowed the service of one ewe, and only one connection, and should be returned to his apartment. The ewes should all be served during the day, dividing the time between service by the number to be served. This procedure should be continued daily during the tupping season, and a definite record of each day's service should be made for future reference, noting the number of the ewe, the day of service, and the ram used. The advantages of adopting this plan are—first, the ram is at all times in a good copulating condition, and will be able to serve a larger number of ewes; second, the lambs are dropped strong and healthy; third, the breeder will be enabled to remedy slight defects by proper coupling; and fourth, it has been the writer's experience that this course will insure a larger proportion of ewe lambs, which is generally considered desirable. The proper care and management of the breeding ewes will also contribute in no small degree to the ultimate success of the flock. No ewe should be allowed to breed until she has arrived to maturity, which, in the Merino breed, will not be until three years old. If allowed to breed before this, the ewe herself will not only be injured, but if such a course is continued for several generations, the offspring will become feeble in constitution, and a dwarfish race will be the result. The ewes should have a liberal amount of feed during the suckling period, in order that the lambs may be able to make good growth without exhausting their dams. After weaning, as soon as their milk is sufficiently dried, they should be put into good pastures, in order that they may become fully recruited before receiving the male again. During pregnancy they should receive suitable feed and that kind attention which their circumstances demand.

Winter Management of Sheep.—Much of the success of the wool-grower depends upon the winter management of his flock. Sheep are animals which pay their owners better for good care and keeping than any other stock usually kept on a farm; but if fed with a stingy hand, or neglected, if suitable conveniences are wanting, they pay perhaps as poorly as any. The annual loss to the United States, resulting from a want of suitable sheds and other conveniences for the winter accommodation of sheep, is immense. The promptings of self-interest would seem sufficient to induce our farmers to adopt a better system of winter management. No intelligent farmer at this day will attempt to deny the principle that warm enclosures are an equivalent, to a certain extent, for food; a variety of well-conducted experiments have conclusively demonstrated the fact. A large proportion of food consumed in winter is required for keeping up the animal heat, and consequently,

in proportion as the apartments are warm, within certain limits, the less amount of food will be required. The other extreme, too close apartments, would be objectionable from the impurity of the air, and should be avoided. Sheep have very little reason to fear injury from this cause. The majority of those in our State suffer for the want of shelter, and a suitable quantity and variety in their winter food. Many flocks are brought to their winter quarters in fair condition, but are fed so sparingly that the growth of their wool is almost wholly arrested during the winter season, the fodder given them being only sufficient to sustain the vital fuctions. Under such circumstances the food consumed by them is in fact nearly lost. The owner has received no return in the increase of wool nor in bodily weight; and he will suffer further from a large per cent. of actual deaths before the time of shearing.

With such a course of management the profits of wool-growing will necessarily be small. If neither self-interest nor the feelings of humanity will induce the farmer to provide properly for his dependent flock, he will find it for his advantage to keep some other domestic animal, and I know of nothing more suitable for such men than the hardy goat. While I protest against the starving system, it would seem hardly necessary to caution farmers against the opposite extreme, too high feeding, which is also detrimental to the health and long life of the animal. While preparing sheep for the butcher, high feeding is necessary and proper, but for store sheep and breeding ewes an over amount of fat, produced by high keeping, is decidedly injurious; and, aside from the attending expense to produce this state of things, it has a tendency to shorten the lives of the sheep and enfeeble the offspring. The forcing system of feeding brings animals to maturity early, but is productive of premature death.

The proper and the most profitable mode of feeding, for breeding and store sheep, is that which will develop in them the highest degree of bodily vigor. Sheep fed in this manner would endure the fatigue of a long journey, while those high fed would fail from the excess of fat, and the scantily fed from muscular debility. Every wool-grower will find it for his interest to provide warm, capacious, and well ventilated sheds for his flocks, with a convenient access to pure water. The feeding racks should be made with good tight bottoms, in order that the chaff and seed, the most valuable part of the hay, may not be lost. Such racks will also answer for feeding out roots and grain, and will avoid the necessity of having an extra lot of troughs for that purpose.

The different ages and classes of sheep should be properly assorted. This classification, however, must be left to the judgment of the breeder. The size of his flock and his conveniences for keeping will determine the extent of the classification. It will be necessary, in all flocks of considerable size, to place the strong and the feeble in separate flocks. The breeding ewes should constitute another division, and so on with the lambs, keeping each class and age by themselves.

In regard to the question, How often should sheep be fed? a difference of opinion among good managers exists. While one believes that twice a day is sufficient, another thinks it desirable to feed three or four times; but the most important point, I apprehend, is to feed regu-

larly, whether twice, three, or four times a day. The writer feeds, at present, hay twice one day; the next, hay in the morning and straw at night, and so on, giving hay and straw alternately instead of hay; and, aside from the above, a feed of roots and grain is allowed at mid-day, allowing a half bushel of corn and cob, or oatmeal mixed with two bushels of roots to the one hundred head. As sheep are fond of a variety of food, it is desirable to make as many changes as practicable. If allowed constant access to pine or hemlock boughs through the winter, it will be conducive to their health. Salt is also equally as essential in winter as in summer, and should be kept constantly by them. Rock salt, which is imported in large lumps, weighing from 20 to 50 pounds each, is the cheapest and best. Sheep are not liable to eat it in sufficient quantities as to ever injure them, as they can only get it by licking.

Winter Lambs and their Management.—There is no difficulty in rearing lambs in the winter season, provided the ewes have been well kept, and have a warm, convenient place for their accommodation, and are properly fed while suckling. There should be prepared, previous to the lambing period, several small pens, about three feet square, with a convenient place for feeding. As soon as the lamb is dropped, it should be placed with its dam in one of these pens, and there allowed to remain until it is sufficiently strong to be removed to a larger apartment, which will usually be at the age of two days; but, previous to the removal, the lamb should be numbered corresponding to the dam, as the writer believes all good shepherds will have their flocks permanently numbered. This being done, several sheep and their lambs may be allowed to run together, and the small pens again occupied by sheep having young lambs. At the age of two or three weeks, the lambs will need to be fed with roots, oats, wheat bran, &c., for which purpose it will be necessary to have a small pen, adjoining their dams', where they can be kept by themselves, and their food placed in small troughs easy of access and protected so as to keep their food clean, and there will be no further trouble, aside from the annoyance of their bleating for the first few days. They should be allowed the teat three times a day until they are about six weeks old, after which twice is sufficient, and near the time of weaning once a day is all that is necessary.

There are several advantages arising from separating the lambs from their mothers while quite young: first, they will grow faster as they learn to eat much sooner, and can always have a supply of oats, bran, &c., kept by them, which could not well be done if allowed to remain with their dams; second, the lambs are prevented from getting into the racks and damaging the hay, as is always the case if permitted to remain together the whole time; third, it is not uncommon for the lambs to acquire the habit of picking and eating small locks of wool from the legs and thighs of their dams, which is avoided by making the separation. Aside from the above considerations, the lambs soon become gentle, which is of some importance to the flock-master. By adopting a course similar to the above, lambs may be raised in winter that will be as healthy and thrifty as those dropped in April or May.

Summer Management.—Provided the flock has received proper care during the winter, little fear need be entertained of any considerable loss by death in the change from hay to grass. The change, however, should be gradual. As soon as the ground gets bare, and the new grass begins to grow, the flock should be allowed to go to pasture a portion of the day, and the balance of food should be supplied in the form of grain or good hay. A sudden change from hay to a vigorous growth of green pasture would produce serious injury to the whole flock, and should by all means be avoided. Previous to turning them finally to pasture, the fences should be put in good order; and a supply of rock or common salt should be constantly kept in some suitable place, convenient of access. If the ewes have not already yeaned their lambs, they should be brought to the fold at night and receive such additional feed as their circumstances demand.

The time for washing and shearing in Vermont is usually in the month of June. This is a matter of importance, and should be attended to as soon as the weather is sufficiently warm. Sheep in this operation, as well as in all others, should be carefully handled. The washing should be done in a thorough manner. If effectually wet by a soaking rain, it will be a favorable time to commence the operation; otherwise, the sheep should be wet by plunging them into the water, and after standing in the sunshine an hour or so, they should be taken into deep water where there is a clear gravelly bottom. A spout conveying a good stream of water, with at least four feet fall, should be brought to bear upon all parts of the fleece until the water runs perfectly clear from all parts of the body. Previous to shearing, they should run from five to eight days in a clean pasture.

The above is the proper mode of preparing wool for market, and is that which the writer has practised until the two seasons last. The propriety of washing the fleece upon the back of the sheep is a point about which there is an honest difference of opinion among wool-growers. The practice has, for its support, the weight of ancient usage; but at the same time is liable to serious objections. It will not be denied that sheep often suffer more or less injury, and sometimes even death from exposures incident to the washing process. It is not here intended to discuss this matter at length, but I will state that for the last two years I have shorn a portion of my flock in the month of April and May, which would preclude the possibility of washing. Some of the reasons for early shearing may be stated: first, the sheep is relieved from a heavy burden of wool, and will suffer less from cold after the first of May, provided they are sheltered in rough weather, than from heat by wearing the fleece until the middle of June; second, they will be better prepared for the cold of the succeeding winter; third, those selecting sheep for breeding purposes will be better enabled to judge of the style and quality of the wool; fourthly, the farm work is less urgent at this period, and more attention can be given to marking, numbering, and weighing, both sheep and wool. Sheep shorn thus early will require warm apartments for several days, and without such conveniences it will be proper to delay shearing until the usual time. During the summer season, considerable attention is due to the flock. Changing pastures once or twice a month contributes to the

health and thrift of the sheep. Tarring their noses should by no means be neglected, as this is a preventive against the fly, which causes the maggot in the head. This should be done at the time of shearing, and as often after as once in four weeks during the season.

Method of Marking or Numbering.—This is a matter of considerable importance, and should be properly done. A temporary marking may be made by stamping the initials of the owner's name upon the backs of the sheep with tar or black paint, which will enable the owner to distinguish his own from his neighbor's; but aside from and in addition to this, it is absolutely essential in judicious breeding to adopt some convenient system of permanent marking whereby the breeder may be able to keep a definite history of the pedigree of every individual member of his flock. The practice of mutilating the ears to the extent adopted by some farmers should be avoided. The rams may very properly be numbered by burning the numbers into their horns.

The Germans have two methods of permanent numbering; one of which consists in cutting small notches in different parts of the ears, each notch indicating a definite number; the other in tattooing the numbers in the inside of the ears. A description of these methods, with illustrations, may be found in the Patent Office Report for 1847, p. 279. I adopt the tattooing system, and thus avoid cutting the ears. In the right ear is placed the regular number, while in the left are figures which denote in what year the lamb was yeaned, which readily shows the age of the sheep at all times. With this system of marking, and a proper method of registering, the sheep-breeder will be able to compete with the cattle-breeders in giving a long pedigree.

Docking Lambs.—This should be done previous to or at the time of shearing. The tail should be cut so as to allow the loose skin to project over the end of the bone in order to hasten the process of healing. In order to prevent excessive loss of blood it will be advisable to tie up the main artery of the tail. This process may be considered by many a foolish or unnecessary refinement, but be that as it may, I am willing to assume originality in the practice. Can a man in health loose three or four quarts of blood without injury? The loss of a few ounces will not prove less injurious to a young lamb. It is not unfrequent that death actually follows excessive loss of blood, but a much larger proportion will suffer an unnecessary shock to the constitution by the loss.

SHEEP HUSBANDRY IN SPAIN.

In the course of my sojourn in Spain, in 1833, I made it a point to visit some of the sheep-walks, with the view of procuring such information from the shepherds relative to the management of the Merino as could be drawn from them. The result of those inquiries, together with other facts since obtained, are embodied in the following paper, which, it is hoped, may prove of service to some of those who have embarked in this important branch of rural economy. D. J. B.

In Spain there are at present two domestic breeds of sheep, which differ widely from one another, both in their habits and in the properties of their wool. One kind has, for a long period, existed in the

warmer parts of that country, and is known by their long, coarse, hairy wool · and the other, which migrates every spring from the plains and valleys of Andalusia, Estremadura, Murcia, Valencia, and Catalonia to the cool mountains of Old Castile and Arragon, where they pass the summer and return again in autumn to feed, during winter, on the warm plains below. The latter, which includes the pure Merino, are distinguished from the common sheep by a loose skin hanging from their necks, and in having wool on their foreheads and cheeks, and frequently down their legs nearly to their hoofs. The horns of the males are very large and ponderous, and are usually rolled laterally, one part over another. Their wool is long, fine and soft, and is twisted into glossy spiral ringlets. It naturally contains a large proportion of oil, to which dust and other impurities adhere, and give to the animals a dingy and unclean appearance that conveys to the casual observer an idea of inferiority, but on parting it all doubts are immediately removed, when its unsullied purity and fineness are brought to view. There also exist in Spain several intermediate breeds, among which are the Pyrenean races, with remarkably fine wool, and somewhat resembling that on the South Downs of England. In general, they are polled, but some have horns, which turn behind the ears, and in the males project forward half a circle. Their legs, which are short, are white or reddish; their faces speckled, and in some a small tuft of wool grows on their foreheads. Their color varies from white to a reddish yellow, and, in a few instances, they are entirely black. There is also another race in Biscay, which have from four to six horns, but they are not of the fine-wooled variety.

The example of Columella, of importing African rams, was repeated by Don Pedro II., king of Arragon, in the early part of the thirteenth century, and afterwards by Cardinal Ximenes, prime minister of Spain; and to that epoch is to be ascribed the superiority of Merino wool over that of all other domestic breeds. With regard to the cause of this superiority, some impute it to the sheep passing their lives in the open air, in a dry and equable climate; others to the nature of the soil and vegetation upon which they feed, and to their migrating semi-annually from one part of the country to another; and a third class, to the peculiar manner of smearing their backs at a certain period, a process hereafter to be described; but it is most probable that they do not so much owe the fineness and quality of their wool to the reasons above assigned, as to the uniform, systematic, and unceasing care with which they are managed through every stage of their existence, and the pure, unmixed, and isolated condition in which each flock is kept from generation to generation. For it appears as a matter of certainty that the sole design of removing these sheep from one district to another is to feed; and it is equally certain that these journeys never would be undertaken if a sufficiency of good pasturage could be found in one place during the year; and, besides, it is a noted fact that there are stationary flocks in the plains of Estremadura, where frost is seldom seen, and about the mountains of Old Castile, where snow often falls in June, both of which produce wool of an equal degree of fineness to that of the itinerant flocks that change their quarters every six months. It has been asserted, and believed by some, although controverted by several well-

informed persons, that regions abounding in aromatic plants are more favorable to the health of sheep, and consequently to the fineness of their wool, than those entirely destitute of such plants. Two instances, well supported, will perhaps be sufficient to refute this opinion. The territory of Montaña, in Old Castile, is one of the most elevated tracts in Spain, where the neighboring mountains rise in the atmosphere to a line of perpetual snow. Its hills consist of sandstone, covered with a deep clayey soil; black marble, marked with white and yellow veins; grey limestone, containing marine petrifactions, talc, gypsum, and numerous saline springs; and in the plains and valleys emery abounds, both occurring in large blocks and incorporated in the soil. The soils of the mountains and hills are noted as being of a similar composition with the rocks beneath them; and experience has taught the Spanish farmers that the sod which covers the limestone districts is best adapted to the growth of wheat and maize; that the clayey soil lying upon the sandstone is stiff and difficult to till; and that the intermediate soils, resting upon mixed formations, are not very productive without the application of manure. The hills and plains of this region, which are destitute of aromatic plants, afford the finest of pasturage to numerous herds of sheep, cows, and horses, the latter two of which are fed on hay during the winter months, a very rare circumstance to occur in any part of Spain or the south of Europe generally. The other instance referred to is the territory adjacent to the town of Molina, in Arragon, which abounds in aromatic and odoriferous plants, and is celebrated for its good pasturage and fine flocks, yet their wool is of no better quality than that of the sheep of Montaña, where no aromatic plants are to be found. The hills and mountains about Molina are composed of red and grey sandstone, limestone, gypsum of various colors and stages of decomposition, dark and light-colored granite, intersected by numerous veins of lead, iron, and copper, the latter of which contains silver, sulphur, and arsenic; and all the surrounding country is rich in springs from which large quantities of salt are annually made. Without digressing further from the subject, it may not be improper to state that the pastures of Spain are generally prolific in sweet grasses suitable for grazing, several of which are indigenous; and others have been introduced from northern Africa, the East, and other parts of Europe.

That the quality of wool depends much upon climate there can be no doubt; for it is a well established law, that the wool of sheep, in the torrid zone, degenerates into a species of hair; and in very cold, rigid ones, though fine near the roots, it becomes coarse toward the ends. Hence it is only in temperate latitudes where wool approaches to a state of perfection; and its fineness in the Merinos, doubtless, is owing, in a great measure, to their being able to pass their lives in the open air, free from the extremes of heat, cold, and moisture, common to some countries, and where their unobstructed but less abundant perspiration is allowed to be swept away as fast as it flows. It is a remarkable fact, that all the sheep in Spain, which constantly live in the open air, perpetuate their color and other properties to their progeny; and it is equally remarkable that the swine of that country, which run wild in the woods, are invariably clothed in fine, curly, black hair;

and hence the Spanish proverb, "Never did a Spanish hog's bristle pierce a shoe."

Classification of the Sheep, and Laws regulating the Flocks.—The fine-wooled flocks of Spain, in the language of that country, are called "trashumantes," or travelling sheep, in contradistinction to the "estantes," or those which are stationary. The former, let it be recollected, migrate every spring from the warm plains and valleys of the south, to the cool, mountainous regions of the north, where they pass the summer, and return again in autumn to pass the winter below. It is obvious that migrations of so frequent occurrence, and to so great an extent, would necessarily require some fixed regulations. Hence a great number of ordinances, penal laws, privileges, and immunities, were enacted or set forth in different reigns for the preservation and special government of these sheep; and hence the origin of the ruinous privileges of the "mesta." This was an association of proprietors of large flocks, consisting of rich religious communities, grandees of Spain, and opulent individuals with hereditary rights, who fed their sheep at public expense during every season of the year, which eventually gave rise to a custom first established by necessity. The mountains of Saria and Segovia, condemned to sterility by the climate, soil, and the steepness of their sides, were formerly the asylum of some neighboring flocks. At the approach of winter, the place was no longer tenable. The sheep sought in the neighboring plains more temperate air. Their masters soon changed this permission into a right, and united themselves into an association which, in time, became augmented by the addition of others, who, having obtained flocks, were desirous of enjoying the same privileges. The theatre was extended in proportion as the actors became more numerous; and, by degrees, the periodical excursions of the flocks were extended to the plains of Estremadura, where the climate was more temperate, and pasturage plenty.

The mesta requires the parts of the country where the sheep are pastured to be set off in divisions, separated from each other only by landmarks—fences, or other kinds of enclosure, being deemed unnecessary, as the flocks are constantly attended by shepherds and dogs. Each of these divisions is called a "dehesa," and must be of a size capable of maintaining about one thousand sheep in the grazing stations of the north, and a greater number in those of the south, where the lambs are yeaned and reared. Every proprietor must possess as many dehesas in each province as will maintain his flock, which, in the aggregate, is called a "cavaña," and is divided into as many subdivisions, or tribes, as there are thousands of sheep contained in it. Each cavaña is governed by an officer called "mayoral," or chief shepherd. For each subdivision of a thousand sheep, there is allowed five under-shepherds and five dogs. The chief shepherd is required to be the owner of four or five hundred sheep, must be strong, active, vigilant, intelligent, and well skilled in everything that relates to his flock. He has absolute control over fifty shepherds and as many dogs, whom he chooses, chastises, or discharges at will. Some of the inferior shepherds assume the title of "rabadan," or "zagal," whose duty it is to exercise a general superintendence over his tribe, under the direction of the mayoral; also to prescribe and administer medi-

cines to the sick and maimed. At the period of travelling, and when the ewes are giving birth to their young, two or more extra hands are allowed to every tribe; and in time of shearing, one hundred and twenty-five shearers are required to a flock of ten thousand sheep.

On the propriety of law and order in conducting these flocks there can be no doubt; but great exception is made to several enactments in force, and a continued struggle has long existed between the company of the mesta on one part, and the lovers of public good on the other. No land that has once been occupied for grazing can be tilled before it is offered to the mesta at a certain rate. Long, green roads, leading from one district to another, at least two hundred and fifty feet wide, are required to be kept open, as well as extensive resting places, where the sheep are fed and sheared. So rigid is the law on this point, that, during the periods of migration, no person, not even a foot passenger, is allowed to travel on these roads, unless he belongs to a flock. These passages must unavoidably cross many cultivated spots such as corn-fields, vineyards, olive orchards, and pasture lands common to towns, the evils and inconveniences of which are obvious and need no comment. All questions and difficulties between the shepherds and the occupants of the lands through which the roads are suffered to pass are decided by special courts that perform a kind of circuit, and sit at stated periods to hear and decide.

The Shepherds.—The salary of the chief shepherd does not exceed two hundred dollars a year and a horse; that of the first under-shepherd of a tribe, ten dollars a year; the second, seven dollars; the third, five; the fourth, three; and the fifth, a boy, two dollars a year. The ration of each is two pounds of bread a day, with the privilege of keeping a few goats in the flock for their milk. They are also entitled to the skins and carcasses of the culled sheep and lambs, and each receives from the chief shepherd a "regalito" of three-fourths of a dollar in April and October, and these are all the sweets that these poor wretches enjoy, with the exception of about a month in a year, which each takes in his turn, to visit his family or friends. They are exposed the rest of the time to all the vicissitudes of the weather, and at night have to lie in miserable huts formed of stakes, brambles, or branches of trees, and often sleep, as they term it, *de abaxo las estrellas*—under the stars.

The Dogs.—The dogs are generally black and white, of the size of a wolf, with a large head, thick neck, and are somewhat allied to the mastiff breed. They are allowed two pounds of bread each a day, and as much milk and flesh as can conveniently be spared. They are so fierce and strong that no wolf can resist their attacks, and to render them doubly secure, their necks are often fortified with heavy collars armed with sharpened spikes. The bear, however, is a more powerful enemy, and if he can reach a tree he is comparatively safe. It is said, he raises himself on his hind legs with his back to the tree, and sets the dogs at defiance. In the night time, the shepherds sometimes keep off the bears by whirling firebrands in the air, but they generally rely on the vigilance of the dogs, which rarely bark unless an enemy is at hand. The dogs are also taught to guard the sheep on the road, and to prevent the mingling of different tribes. Should a

sick or wearied sheep lag behind on the way, unobserved by the shepherds, it is the duty of a dog to protect it, until some one returns to afford relief.

Mode of giving Salt to the Sheep.—The first thing the shepherd does when his flock returns from the south to their summer downs, or pastures, is to give them as much salt as they will eat. Every owner allows to each tribe of a thousand sheep twenty-five quintals of salt, (2,500 pounds,) which they consume in about five months. They eat none in their journeys, nor are they allowed any in winter, for it is a prevailing opinion that it produces abortion when given to ewes forward with young. This has ever been the custom, and is thought to be the true reason why the kings of Spain could never raise the price of salt to the height it has maintained in most parts of France; for it would tempt the shepherds to stint the sheep, which, it is believed, would weaken their constitutions and deteriorate their wool. The shepherd places fifty or sixty flat stones at the distance of about five paces apart, strews salt upon each, leads the sheep slowly among them, and every one is allowed to eat of it at pleasure. But when they are feeding on limestone land, whether it be on the grass of the downs, or on the little plants of the corn-fields after harvest-home, they eat no salt; and if they meet a spot of a mixed formation, they are said to partake of it in proportion as the soil is mingled with clay. The shepherd being aware that his sheep will suffer if deprived of salt, leads them to a clayey soil, and, in a quarter of an hour's feeding, they march to the stones and devour whatever they need.

Caution in allowing the Sheep to imbibe Frost or Snow.—One of the shepherd's chief cares is not to suffer his sheep to imbibe, in the morning, the frozen dew or melted frost, and never to approach a pond or stream after a shower of hail. For, if they should eat the dewy grass, or drink the melted hail, the whole tribe, it is believed, would become depressed in spirits, lose their appetites, pine away, and die, as often has happened. Hail water is also so pernicious to man, in that climate, that the people have learned, by experience, not to drink from a rivulet or stream until some time after a violent storm of hail.

Disposal of the Males.—On the last of July, six or seven rams are permitted to run with every hundred ewes, and when the shepherd judges they are properly served, he collects the former into a separate tribe, to feed by themselves. There is also another tribe of rams, which feed apart, and never serve the ewes at all, but are merely kept for the butchery, or for their wool. Although the wool and flesh of wethers are finer and more delicate than those of rams, the fleeces of the latter weigh more, and the animals are longer lived. The longevity of the sheep also depends upon the perfection of their teeth; for, when these fail, they cannot bite the grass, and are condemned to the knife. The teeth of the ewes, from their tender constitution and the fatigues of breeding, usually begin to fail at the age of five years—the wethers at six—and the robust rams not until they are nearly eight years of age.

Smearing the Sheep.—Towards the close of September, the shepherd performs the operation of smearing the sheep with a heavy, irony earth, common in Spain. It is first mixed with water, and then daubed on their backs, from the neck to the rump. Some say it mingles with the

oil of the wool, and thus becomes a varnish impenetrable to the cold and rain; others, that its weight keeps the wool down, and prevents it from growing long and coarse; and a third class, that it acts as an absorbent, and receives a part of the perspiration, which would otherwise foul the wool and render it rough. Be this as it may, it is a custom of long standing, and probably is useful both to the fleece and to the animal which carries it, and answers the purpose of destroying vermin.

Return of the Sheep to Winter Quarters.—At the end of September, the sheep commence their journeys towards the lower plains, their itineraries being marked out by immemorial custom, and are as well regulated as a march of troops. Each tribe is usually led by six tame wethers, called "mansos," which are obedient to the voices of the shepherds, who frequently give them small pieces of bread to encourage them along. The sheep feed freely in all the wilds and commons through which they pass; and often the poor creatures travel fifteen or twenty miles a day, through the crowded lanes, to get into the open wilds, where the shepherd walks slow, to let them feed at ease and rest; but they never stop, have no day of repose, and march two or three leagues a day, ever following the shepherd, always feeding or seeking with their heads toward the ground, till they arrive at their journey's end. The chief shepherd is cautious to see that each tribe is conducted to the same district in which it fed the winter before, and where the sheep were yeaned, for it is thought to prevent a variation in the wool; though, indeed, this requires but little care, as it is a notorious truth that the sheep would go to that very spot of their own accord, although the distance is sometimes full one hundred and fifty leagues, which cannot be travelled in much less than forty days.

The first thing to be done after the sheep return to their winter plains, is to prepare the "toils," in which they are to pass their nights, lest they should stray away and fall into the jaws of the wolves. The "rediles," or toils, consist of enclosures of net-work, with meshes a foot in width, and of the thickness of the finger, made of a species of rush called "esparto" (*Lygeum spartum.*) This plant is also much used in the south of France and Spain, for making ropes, mats, baskets, &c., and was also employed for similar purposes by the ancient Romans.

Yeaning and Management of the Lambs.—About the end of December the ewes begin to bring forth their young, which is the most toilsome and the most solicitous period of the pastoral life. The shepherds first separate the pregnant from the barren ewes, and conduct them to the best shelter, and the others to the bleaker parts of the district. As the lambs are yeaned, they are led apart with their dams to a more comfortable place. A third division is made of the lambs last brought forth, for which was allotted from the beginning the most fertile spot, of the sweetest feed, and of the best shelter, in order that they may grow with as much vigor as those first yeaned; for they must all set off the same day, in spring, towards their summer quarters.

It is the interest of a proprietor to increase his flock to as large a number as the land allotted to it can possibly maintain; in consequence of which, the sheep are always low kept. When a flock has arrived at that point, all further increase is useless, as there is but little sale for these sheep, unless some neighboring cavaña has been reduced by mor-

tality. Hence most of the lambs are killed as soon as they are yeaned, and each of those preserved is allowed to suck two or three ewes.

In the month of March, the shepherds perform four operations on the lambs, about the same time. They first cut off their tails five inches below the rump, in order to preserve cleanliness; they next brand them on the nose with a hot iron, making a permanent mark, or character, indicating the flock to which they belong; and then saw off a portion of their horns, to prevent the rams from hurting one another, or the ewes. The fourth operation is to render impotent the lambs destined for docile bell-wethers, to walk at the head of each tribe. This is not done by making an incision, as with us, but by turning the testicles with the fingers twenty times round in the scrotum, twisting the spermatic cords, as a rope, and the parts wither away without danger.

Migration of the Sheep to their Summer Retreats.—As soon as the month of April arrives, which is the period of departure from the winter to the summer quarters, the sheep manifest, by various uneasy motions, a remarkable restlessness, and a strong desire to be off. At this time, it is necessary that the utmost vigilance should be exercised, lest the sheep should escape, as it has often happened that a tribe has stolen a forced march of three or four leagues upon a sleepy shepherd; but he is sure to find them, by pursuing the same road over which they came the autumn before; and there are numerous instances of three or four strayed sheep walking a hundred leagues to the very pastures where they fed the preceding year. Thus they all go off towards their summer retreats in the same order as they came, only with this difference —the flocks which migrate to Old Castile are shorn on the road, and those which go to Arragon are shorn at their journey's end.

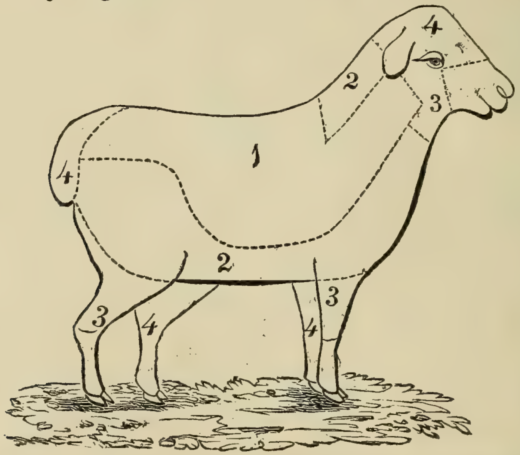
Shearing of the Sheep.—The season for sheep-shearing in Spain, like the harvest and the vintage in corn and wine countries, is a time of great festivity and rejoicing, both to the proprietor and the workmen. A multitude of shearers, washers, and other attendants are fed upon the flesh of the culled sheep, and it would seem that the slaughter occasioned by this season of feasting would be sufficient to consume the whole flock.

The operation of shearing commences on the first of May, provided the weather be fair; for if the wool be not quite dry, the fleeces, which are closely piled upon one another as soon as they are taken off, would ferment and rot. It is for this reason that the business is performed in large spacious buildings called "esquileos," which are usually so arranged as to receive entire flocks of twenty, forty, and even sixty thousand sheep; and, besides, the constitutions of the ewes are such, that, if they were exposed immediately after shearing to the air of a bleak, stormy night, they would all perish.

A certain number of sheep are led into the great shelter-house, built in the form of a parallelogram, four or five hundred feet long and one hundred wide, where they remain during the day. As many sheep as it is judged can be dispatched by the shearmen the next day are driven into a long, narrow passage, called "sudadero," or sweating place, where they remain all night, crowded as closely as possible together, in order that they may profusely sweat, which is to soften the wool for the shears, and, as the shepherd says, "to oil their edges." By degrees,

the next morning, the sheep are led into the spacious shearing room, which joins the sweating place. As fast as they are sheared the shepherd carries them off to be marked with tar, which usually consists of the first letter of the name of the proprietor, and each subdivision is denoted by the part of the sheep on which this letter is placed; and as this operation is necessarily performed upon one at a time, it gives a fair opportunity to cull out for the butchery all the sheep of the flock which have lost their teeth.

A man can shear twelve ewes in a day, or eight rams. The fleeces of three of the latter often weigh, in the dirt or yolk, twenty-five pounds, which is equivalent to those of four wethers, or five ewes. The reason of the difference in the number of sheep sheared in a day is, not only because the rams have larger bodies, are stronger, and have more wool, but the shearmen dare not tie their feet as they do those of the unresisting ewes. Experience has taught them that a bold, rebellious ram would struggle even to suffocation thus confined under the shears; consequently they gently lay him down, stroke his belly, and actually beguile him out of his fleece.



The sheep that have been shorn are allowed to go to the fields if the weather be fine, in order to feed during the day, and in the evening they return to the yard in front of the shearing house to pass the night, and if the weather be cold or cloudy they are sheltered within. Thus they are brought by degrees to endure the open air, and their first days' journey from the esquileos to the mountains are short, where we will leave them, having followed them through their annual peregrinations, and go back to their wool.

Sorting and Cleaning the Wool.—The sheep and shearers being dispatched, the first thing to be done is to weigh and pack up the fleeces, and convey them entire to a place to be scoured, if they are to go out of the kingdom, or to any considerable distance within it; for as the wool is said never to lose less than half its weight in the operation of scouring, and often more when the sweating has been violent, at least one half the expense of transportation is saved. As soon as the wool reaches the scouring places, it is given to the "apartadores," whose business is to separate it into three parcels of different qualities, as denoted by the diagram above.

No 1 is styled *refina*, or first quality; 2, *fina*, or second quality; 3, *tercera*, or third quality; 4, *cayda*, or refuse. That taken from the back, flanks, and sides of the neck of the sheep is regarded as of the first quality; that from the breast, belly, sides of the haunches, and from the back part of the neck, the second quality; that from the cheeks and throat, the fore legs above the knees, the hams, and back part of the haunches, the third quality; and that which is taken from the rump, the extremities, and from between the legs, is of the fourth quality, and is comparatively worthless. Formerly the second quality was taken only from the haunches and belly; the third quality from the back part of the neck, the cheeks, throat, breast, fore legs and hams; and the fourth quality from the top of the head, the tail, and the extremities of the hind legs. Hence a different value is fixed upon each of these classes of wool, although it has long been a custom in some provinces to sell the whole pile together at a mean price.

As soon as the wool is properly assorted it is spread upon wooden hurdles and beaten with rods, in order to deprive it of as much of the dirt and dust adhering to it as possible previous to its being scoured. In selecting a situation for a scouring place, a valley open to the sun, is preferred, through which runs a stream of pure water, and where there are inclined meadows sufficiently spacious for drying the wool. The fixtures and apparatus for scouring consist of one or more large copper caldrons, mounted on a furnace, and provided with appropriate cocks, pipes, gutters, &c., for conducting hot water into three square pits, or wells, (one for each class of wool,) lined with masonry, and are about a yard in depth. These wells are filled to half of their depth or more with wool, upon which there is let fall from the caldrons a current of water heated to a temperature of 120° to 140° F., and even higher, according to the degree of fineness, and the condition of the article to be scoured. The finer the quality, and the more dirty the wool, the higher it becomes necessary to carry the temperature. The wool thus disposed is turned in the hot water in every direction with a large fork, or some other implement, for a space of five or six minutes, and is then spread on wooden hurdles, a yard or more in width, situated along side the pits, in order to drain off the water and filth which has already begun to dissolve. Directly by the side of these hurdles is a narrow aqueduct formed of masonry, or stone, through which flows a current of cold water, into which the wool is next thrown. It is received at the head of the aqueduct, and is carried along its length by the force of the current, being pressed and rubbed in its passage by the feet of one set of men, until it is at last thrown out by another upon an inclined plane, formed also of masonry, or stone, where it is left to drain. At the lower end of the aqueduct is placed a small net for catching such locks as may accidentally escape the washers above, and, thereby, prevent them from being carried away. As soon as the wool is well drained it is spread upon the grass in the neighboring meadows, and, in the course of four or five hot sunny days, it becomes sufficiently dry to be packed up and sent away to the manufactories or to the places of shipment. It is usually put in canvass bags, of various sizes, on each of which are marked an initial letter indicating its quality, and other letters or signs denoting the flock and sub-division it is from, so that the

experienced wool-stapler is enabled to distinguish, at sight, the nature of each bale and the cavaña to which it belonged.

Imperfect as this mode of scouring appears, it answers every purpose for preserving the wool during the longest voyage; and if a similar mode were adopted in the United States, particularly with the fine, wooled races, or those the fleeces of which are intended for felts, instead of washing it on their backs, as is generally the case, it would doubtless be much improved. It is a well-established fact, that if wool remains in the yolk for a period of six months or a year, and then be scoured, it will yield a greater weight of clean wool than if washed when newly shorn; but in the process of fulling, the articles made from it become more loose and less uniform in their texture, are weaker, less durable, and, consequently, less valuable to the consumer. And here it is to be regretted that the interests of the wool-grower, of the manufacturer, and of the consumer, are not looked upon as the same.

The fibre of wool is known to consist of small capillary tubes filled with one kind of oil, regarded as the *marrow*, and is surrounded by another oil, or rather soap, commonly called the *yolk*. The latter, by weight, with other impurities, constitutes from 50 to 75 per cent. of the wool, and in some cases even more, according to its quality. The finer the wool the more abundant is the yolk. The solid part of the fibre is soluble neither in cold nor in hot water unless heated to a certain point. From 22 to 29 per cent., by weight, of the yolk, will readily dissolve in pure water of a temperature of 120° to 140° F., but not in a cold bath, even if it were to remain for three or four days; and in the ordinary process of scouring in Spain there is left of this substance in the wool from 4 to 7 per cent. That portion of the yolk which will dissolve in cold water, if suffered to remain on the fibre for a long time, causes it to "swell up," according to Vauquelin, "split, and lose its strength;" whereas, if it be removed by soaking the wool in cold water for twenty-four hours, and then subjecting it to a clear running stream, as practised in Spain, the part remaining will become indurated in time, converting itself, as it were, into new wool, and will tend to preserve rather than injure the fibre from the attacks of insects and from decay.

A contrariety of opinion appears to prevail with regard to the best mode of washing or scouring wool. One class of persons advocate washing it on the backs of the sheep; another in hot water; and a third class in a cold bath after it is shorn. The first mode is regarded by Messrs. Perrault de Jotemps and Girod, of the department of Ain, in France, as being often dangerous to the health of the sheep, and scouring in hot water as inexpedient, and, at the same time, injurious to its quality. The mode that they prefer is to allow the wool, as soon as shorn, to soak in pure cold water for a greater or less length of time, according to its degree of impurity, which, ordinarily, will not exceed twenty-four hours, and then subject it to a cool running stream in a similar manner as practised in Spain. Experience has taught them that, by this mode of scouring, the wool is of a better quality, and suffers much less by waste than by the hot water process; and, besides, as it contains a determinate quantity of yolk, or indurated oil, it enables both the buyer and the seller to judge more accurately

of its value, and ultimately requires from the manufacturer much less labor. The experience of others, however, in preparing wool for felts and the thicker kinds of cloth, would seem to justify the mode of scouring in Spain.

THE KENTUCKY SHEEP.

BY ROBERT W. SCOTT, OF FRANKLIN COUNTY, KENTUCKY.

Our native or common sheep being inferior both in carcass and fleece, and the imported larger varieties being obviously unprolific in this country, neither appeared to answer fully the wants and purposes of the Kentucky farmer. Reasoning by analogy some eighteen years ago, it appeared to me that the two might be blended in such a manner as to produce a cross breed which would be superior, for all our purposes, to either of the originals. The hardy and prolific qualities of our common sheep might be united with the large carcass and heavy fleeces of the imported. Acting upon this impression, a number of the best ewes were selected from a flock of common native sheep, and were bred to a very large and fine Saxony ram, the object being to give in the offspring more delicacy to the mutton, more thickness to the fleece, and more fineness to the staple of the wool. This step was thought advisable before uniting the coarse fleeces of the common sheep with the coarse and more open fleeces of the large imported varieties, and the effect was satisfactory. The ewe lambs of this cross were bred on the first of October, after they were one year old, to an imported Bakewell ram of large, full, round carcass, and long heavy fleece; the object being to increase in the offspring the weight of the carcass and the quantity of the wool. The ewe lambs of this last cross were also, in due time, bred to an imported Southdown ram of large size and high form; the object now being to infuse into the progeny that active, sprightly, and thrifty disposition, and highly-flavored and beautifully-marbled mutton, for which the Southdowns are so justly celebrated. This object was also successfully attained. The wethers of this cross were the delight of the epicure, while the value of the fleece was not diminished, as much being gained in the thickening of the staple of the wool as was lost in its length. The next cross was by a ram which seemed to possess in combination many of the qualities it was desired to establish and perpetuate in the flock.* He was three-fourths Cotswold and one-fourth Southdown—a large, active, hardy sheep, with a thick, heavy fleece, and his progeny possessed the same qualities in an eminent degree.

The next two crosses were with full-blooded Cotswolds, and then with a fine full-blooded Oxfordshire of remarkable softness and silkiness of fleece. These were all large animals, with round barrels, broad backs, and full briskets. They added to the flock still more weight in

* The observant reader may ask whether a cross can be perpetuated or made permanent in a flock, or whether it may not "cry back," in the course of a few years, to one or other of the original forms?—D. J. B.

the carcass, while the beautiful appearance and delicate flavor of the mutton was not impaired. In the fall of 1853, a part of the flock was bred to an imported Cotswold ram, and the rest of the flock was bred to a Kentucky raised Cotswold ram directly descended from imported stock. It is from these crosses that the present stock of Kentucky sheep is composed. Their fleeces are soft, thick, and long, though not so long as the pure Cotswold ; but they are much thicker, which gives them a perfect protection against the snows and cold winds and rains of winter and spring ; the sheep being perfectly hardy, requiring no protection nor shelter, except what nature has thrown around them. The cross with our common or native sheep adapts them perfectly to the soil, climate, and grasses of this country, on which account, together with the frequent crossing, they are strangers to the diseases known to other flocks. The same native cross, I suppose, ensures in them a prolific character, which is sadly wanting in the large imported varieties, flocks of which are still comparatively rare here, though some individuals have been in the country over twenty years.

The Kentucky sheep rarely fail to raise as many lambs, in proportion to the number of ewes, as the common or native varieties, and sometimes more, though they have not had the advantage of a regular shepherd, or attendant. These sheep are also as thrifty as it is desired that they should be. In summer they are often moved from pasture to pasture, so that they may eat the weeds and grasses which have been refused by other stock ; while in winter a short blue-grass pasture is all which they commonly require. When the lambs are coming in March and April, better pasture is given to the ewes; and they will become good mutton on grass alone after their lambs are weaned. They are even liable to get too fat to breed when their lambs are taken from them too early. They do not require grain at any age nor season of the year ; and it has been more troublesome to keep them thin enough for breeding well than to make them fat enough for good mutton. The male lambs have generally been sold for breeding, but all inferior ones have always been castrated. Sixteen wethers of this description, of various ages from two to four years, were once partially grain-fed ; but they were quickly bought by a sheep drover and farmer, before they were half fatted, at $15 a head. The weight of the fleece has been increased from time to time, until a yearling ram has sheared 14½ pounds of wool in the grease, though that is more than the average of the flock. The wool appears to have sufficient gum and grease for the protection and health of the sheep ; yet, there is so little of these, that the wool readily receives our domestic dyes without washing, and the manufacturer to whom I have generally sold it is in the habit of making it into linsey and jeans, without subjecting it previously to any purifying process.

CONDENSED CORRESPONDENCE.

Statement of Anderson Gordon, *of Lewisburg, Conway county, Arkansas.*

Sheep could be raised here with much profit. We have as yet but few, and those of the common sort. Wool is worth from 20 to 25 cents per pound.

Statement of E. Babcock, *of Riley, McHenry county, Illinois.*

Sheep have lately been introduced into this section with favorable results. Cost of keeping, from 50 to 60 cents each, a year. Wool is worth from 25 to 33 cents per pound.

Statement of Martin Mondy, *of Vermilion county, Illinois.*

Wool-growing is attracting the attention of our farmers, and we have many flocks, each containing from 500 to 3,000 sheep. The Spanish Merino is the favorite breed. It is estimated that the increase of the flock will pay the expense of keeping, which averages about 60 cents a head.

Statement of H. F. Moore, *of Big Mound, Lee county, Iowa.*

Sheep, during the past year, have been greatly enhanced in value. We have crosses of the French and Spanish Merinos and Southdowns with our common stock. The Spanish is considered the best. A few rams have been introduced into this State from Vermont, valued at from \$50 to \$200 each. Most of our large flocks consist of French Merinos, with a few Saxons. The best mutton we have is obtained from our common breed. The profit of sheep-raising is about 20 per cent. on the capital invested, including the expense of keeping. It may be remarked, that fleeces of fine-woolled varieties becomes coarse in a few years, owing perhaps to the climate.

The value of a common sheep is from \$2 to \$5. Average yield of wool, 5 pounds to a sheep.

Statement of Hugh M. Thomson, *near Davenport, Scott county, Iowa.*

There are not many sheep kept in this part as yet. The profits on the common kind, after deducting all expenses, losses, &c., and adding the increase in number, will be about \$1 50 per head, or 60 per cent. on the value of the stock where they are judiciously cared for. Merinos are hard to adapt to our climate.

Statement of EDWARD F. GARLAND, *of Aroostook*, (*No.* 11, *range* 5,) *Aroostook county, Maine.*

Considerable attention is now paid to raising-sheep. hey are considered profitable stock when wool is worth 50 cents a pound. We have no pure breeds. Fat sheep are worth $3 a head. Lambs are worth $2 each; when slaughtered 7 cents a pound.

Statement of FRANCIS FULLER, *of Winthrop, Kennebec county, Maine.*

Of sheep, the Merino breed is the most prized and reared among us; and when wool will bring 37½ cents per pound, the business is moderately profitable.

A lamb at one year old or under, can be raised for $1. A sheep at a year old is worth $2; and its wool, when shorn, will pay for its keeping.

The cost of producing wool depends much upon the market value of the carcass; therefore it would be difficult to determine that point. It now brings with us 33 cents per pound.

Statement of EUSEBIUS WESTON, *of Bloomfield, Somerset county, Maine.*

A close calculation would probably show a greater clear profit from raising sheep than from any other kind of stock kept in this region. They come to maturity, and yield profit by wool and lambs much sooner than horses or cattle. But legislation has produced such instability in the price of wool, that not much effort has been made to raise sheep in Maine. The average price of wool is about 34 cents a pound.

Statement of WILLIAM BACON, *of Richmond, Berkshire county, Massachu etts.*

Saxony sheep were at one time in high repute with us, but have gone out of keeping; first, because they are tender, probably from the lightness of fleece, which made them susceptible to the cold and storms of the climate, thus requiring for them much extra care; and, second, although their wool always brought a much higher price than that of Merinos, the produce of income per head was much less than from the latter animal; consequently they have been given up for heavier fleeced, heavier bodied, and more hardy animals. Merinos and Southdowns are now the principal sheep raised, the latter chiefly for its flesh, which it readily takes on, and furnishes mutton of the very best quality.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

The raising of sheep, although of less importance than wheat-raising, has been for some years past our most profitable business. The sheep run upon the fallow lands in the summer, and in the winter go to the straw stacks till towards spring, when hay and a little grain are given to them. The price of wool varies from 25 to 38 cents a pound. Aver-

age 32 cents. Pelts are worth from 31 to 75 cents each, according to the length and quality of the wool. Cost of transportation by lake and canal to New York 50 cents per 100 pounds.

Statement of J. D. Yerkes, *of Northville, Wayne county, Michigan.*

This State is well adapted to sheep-raising, and more improvement has been made in this than any other kind of stock. By a careful course of breeding, our sheep generally have been improved in size and constitution, and the wool increased in fineness, length of staple, and quantity. A large proportion of our flocks is composed of a high grade of French and Spanish Merino. A flock of this description, if well kept, will average 4 pounds of washed wool to the fleece.

The price of wool the past season has ranged from 25 to 30 cents a pound, according to quality and manner of preparing it for the market. Sheep can be transported to New York by railroad for $1 a head.

Statement of H. L. Brown, *of Fayette, Howard county, Missouri.*

We have imported sheep of many races. Among the fine-woolled breeds the French Merino is considered the best. Of long-woolled breeds the Cotswolds have generally been introduced, though they do not appear to be quite so well adapted to our wants as the New Oxfordshires, which have a finer fleece and are more suitable for our domestic uses.

Acting on that opinion, I have this season introduced some of the New Oxfordshire sheep from the flock of Mr. J. T. Andrew, of Connecticut. They are noble specimens of the sheep, and give promise of being all we could desire. I believe they are, as yet, the only ones of the breed in this State.

The first cross of the pure blood with our "domestic stock" is a very great improvement; almost obliterating at once their bad qualities. They have been so long mixed and mingled with each other that no particular "strain" of blood is possessed by them. Hence, when the pure blood is introduced, it at once predominates, the half-bloods very nearly resembling the pure in form and other characteristics. This easy and quick improvement greatly encourages our farmers.

Statement of Lorenzo Rouse, *of Paris Hill, Oneida county, New York.*

The number of sheep kept in this vicinity is diminishing from year to year. In an article published in the Patent Office Report for 1852, p. 187, I endeavored to show, from reliable statistics, that the ratio of decrease for the five years from 1845 to 1850, inclusive, had been about 13 per cent., or a decrease of 64 per cent. in five years, for the county. Assuming that the rate of decrease has continued the same till the present time, which I doubt not will be found to be nearly correct, the number of sheep kept in the county has diminished about one-

half in the last four years, and would stand at less than 35,000 against 194,589 found in the county in 1845. The decrease is owing mainly to the depressed condition of our woolen manufactures, generally, and to the superior advantages of the wool-growers of the great West, who have recently come in competition with us in the production of fine wool, and who will, no doubt, eventually drive us out of the business. So long, however, as the present high prices of meats are maintained, sheep will continue to be kept among us in considerable numbers; but the fine-woolled varieties must give place to those more suitable for mutton. This has already been the case to some considerable extent; and the fattening of sheep and rearing of lambs for market have been found profitable. During the last summer good lambs have brought from \$2 to \$2 50 a head in the Utica market. At this rate, no farmer can be expected to keep fine-woolled sheep merely for the purpose of marketing the wool at the present low prices of from 32 to 40 cents per pound. For mutton, coarser varieties are deemed preferable, and for this purpose are not usually kept in large flocks, but are found to succeed best in small numbers; and in this manner will probably continue to be distributed among our farmers.

Statement of S. A. Collins, *of Sodus, Wayne county, New York.*

A good many Leicestershire sheep are raised in this section of the country for the Eastern markets. The price of lambs in the fall, is from \$2 to \$2 50 a head; cost of transporting to New York from 12½ to 17 cents a head. We have lately introduced the Southdowns, which we consider preferable to the Leicestershires, because they take on fat at an earlier age.

Statement of D. C. M. Evans, *of Scio, Harrison county, Ohio.*

Farmers here consider sheep-raising as profitable as any, if not the most profitable business. We prefer raising good sized sheep, although the wool may not be so fine as the best Saxony, since they have more wool and are worth more for mutton. The proportion of lambs raised annually, to the number of ewes, is 80 per cent. The cost of wool is from 25 to 30 cents a pound. Present price from 38 to 48 cents.

Statement of Elias Green, *of Wakeman, Huron county, Ohio.*

There is no branch of farming which pays a better interest on the outlay than a flock of good sheep. The coarser woolled breeds are preferred here, having hardier constitutions, and being better able to endure the severities of our winters. The cheapest way to winter sheep is to have pastures reserved for them to breed in; and unless the flock is too large for the extent of range, they will require hay only when there is snow on the ground.

Statement of M. F. Myers, *of Kingston, Luzerne county, Pennsylvania.*

Sheep are profitable stock in this county, and the number is on the increase. But many are killed by the dogs. We have some full-blooded Cotswolds and Southdowns. From what I have seen of their crosses upon our common stock, I think a very great improvement will be the result. Wool is now worth 40 cents a pound.

Statement of Zeno P. Wharton, *of Egypt, Wharton county, Texas.*

This is a favored region for sheep. They prosper in every section. The only disadvantage is that they become too fat, which often proves fatal. But this can be prevented by causing the flocks to be driven daily several miles. They are thereby kept vigorous; and the hours of feeding are lessened. A German physician living in my neighborhood was the first to apply this simple remedy. He divided his flock of one thousand sheep into two equal droves, and placed each under the care of a shepherd, whose duty was to drive them to a certain point and back again daily. The benefit of this practice was soon apparent, for the deaths in the flock soon ceased. The ewes also bore lambs twice a year; and he was so much pleased with the result of his experiment that he has since paid exclusive attention to sheep-raising, being convinced that it is the most certain and profitable pursuit in Texas.

Neither the fleece, flesh, nor size, of half-blooded Merino sheep are injuriously affected by bringing them from the other States into this. On the contrary, their flesh is much improved. They also increase very rapidly.

Statement of William Smoot, *of Boone Court House, Virginia.*

This is undoubtedly a fine wool-growing county. Sheep are worth here, this season, $2 per head. It costs 50 cents a head to winter each animal, and not more than 10 cents a head to furnish them with salt during the summer.

Statement of Raleigh W. Dyer, *of Prilliman's, Franklin county, Virginia.*

The cost of producing wool in this section, I believe, does not average more than 18 cents per pound. Our sheep are seldom fed, except when there are deep snows. The mountains afford excellent range in winter. The market value of wool for several years past has been about 37½ cents a pound—sometimes as low as 30 cents; this year it is 50 cents per pound.

Statement of Henry M. Price, *of Nicholas Court House, Virginia*

Owing to the increased attention to wool raising in this region, sheep have advanced 100 per cent. in price, good stock animals being in

demand at $2 a head. The average yield of wool is about 2½ pounds to a sheep. Large tracts are beginning to be opened for the purpose, particularly mountain lands, which are considered the best, worth from $1 to $3 per acre.

SWINE.

CONDENSED CORRESPONDENCE.

Statement of J. H. Forman, *of Oak Bowery, Chambers county, Alabama.*

Next to horses and mules, swine are the most profitable animals to raise in this section. They are more difficult to estimate in consequence of their endless variety and diversity of treatment, some attaining maturity at from 18 to 24 months old, while others require from 30 to 36 months without producing the corresponding weights. The average expense of raising is probably $5, exclusive of mast and grass. Their value when slaughtered is from $10 to $12 each. Very few imported swine have found their way here; nor is it necessary, as they adapt themselves so readily to their circumstances of feed, &c., varieties can be multiplied *ad infinitum* from the same stock by selection and treatment.

Statement of E. Babcock, *of Riley, McHenry county, Illinois.*

Hogs, in this county, are raised in great quantities of almost every breed, from the long-nosed "Hoosier" or "Prairie Rooter," to the small-boned "Middlesex."

Statement of Joseph C. Orth, *of McCleary's Bluff, Wabash county, Illinois.*

Most farmers consider hogs the most indispensable part of their stock. Some few gain largely by raising them, but I sincerely believe, if all the accounts were carefully balanced, the facts would show a heavy annual loss to the producer. Our farmers are not yet properly fixed for the profitable raising of hogs. Too much corn is fed to them, and when they are at last brought into market, generally at two years old, their heads have been twice cut off by corn cobs. The fall of the year, when acorns and other nuts ripen, is the only time that they will thrive without being fed well on that most costly of our crops—corn. Some few experiments have proved that the most profitable food the farmer can provide for swine, in this climate, at any age, is clover, the raising of which may be said to be but just in its infancy.

Of breeds of swine we have a great variety, from the genuine "Land-pike," up to the best "Berkshire." Experience has amply established the

fact that crossing is decidedly advantageous. Many of our hogs do not mature at a less age than two years. These are mostly a large-boned, large-framed animal. Others again mature at a year old, and are generally diminutive in size, but small eaters and take on fat fast. The crossing of such with the large is always attended with decided benefit.

The cost of raising hogs will, of course, much depend upon the kind. Some cost not over $3; others double that sum. For the last two years the producer realized from 4 to 6 cents per pound for pork. This year the probabilities are against so high a figure.

Statement of Edward F. Garland, *of Aroostook, (No.* 11, *range* 5,) *Aroostook county, Maine.*

We have excellent breeds of hogs, but much crossed. Pork is mostly made from oats and peas ground together and mixed with boiled potatoes. None packed for market. Average price 8 cents a pound. Average weight, at 18 months old, 400 pounds.

Statement of Peter Reid, *Lake Post Office, Greenwich, Washington county, New York.*

Although it may not generally be known, I will state the propensity that swine have to eat the droppings of our domestic fowls. When the habit has once been contracted, the hog loses his appetite for food, no matter what its quality, and if he has an opportunity, he seeks it unremittingly. The effects are equal to that of opium-eating on the human species—the animal becoming meagre, dejected, and, if in his power, he constantly attends the fowls, seemingly, only with the intent of gratifying the morbid appetite thus acquired. I know of no remedy except to shut them off from indulging in the fatal habit.

I would here incidentally remark that the swine which have access to the dung of neat cattle, which feed on corn, most industriously follow them and contract this sickly habit; but not to the degree mentioned above. Swine also which bed upon fermenting stable manure become much more susceptible to cold.

Statement of S. A. Collins, *of Sodus, Wayne county, New York.*

But little attention has been paid here to rearing superior breeds of hogs till within a year or two past. The "Suffolks" are taking the lead in this county.

Statement of D. C. M. Evans, *of Scio, Harrison county, Ohio.*

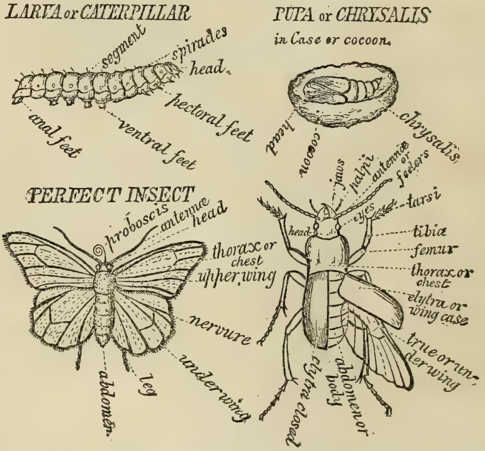
The "Berkshire" and "Irish Grazier" are the best breeds of hogs raised among us. With good feed and care, they will weigh from 300 to 400 pounds each, at 18 months old. Price of pork here varies from $4 to $6 per hundred. The former price will hardly pay for raising.

Statement of GEORGE BUCHANAN, SAMUEL GILLILAND, JAMES T. HALE, DAVID DUNCAN, *and* WILLIAM P. FISHER, *being that portion of their report which relates to swine, addressed to the Centre County Agricultural Society of Pennsylvania.*

The best breeds of hogs in this county are the "Berkshire" and the "Chester-county Whites." These breeds have been introduced frequently in this vicinity, and if they could be kept without becoming mixed with other swine of inferior quality, pork, raising might be a profitable business.

INSECTS.

In order to make a practical farmer acquainted with the structure and transformations of insects, as well as the names of some of their principal organs, it will be necessary to give a very short and consequently imperfect sketch of their anatomy and metamorphoses, which may perhaps aid him in his future investigations.



The word *insect* is derived from two Latin words which signify "cut into," or "notched," the bodies of most of the tribe being divided by several incisions, and the parts between these lines or incisions called "segments." Insects differ from other animals by not breathing through lungs, but through holes, as spiracles, placed at certain distances along each side of their bodies. Their lives are divided into three periods after they have emerged from the egg, the first of which is termed the *larva* state, and is applied to caterpillars, grubs, maggots, as well as to young grasshoppers and bugs, before they attain wings. It is in this larva or caterpillar state that they mostly do the greatest injury to vegetation, as they eat voraciously and generally cast their skins several times as they increase in bulk. After the larva has attained its full size, the second change takes place, when it ceases to

eat, casts its skin, and reappears as a *pupa* or *chrysalis*, entirely unlike the caterpillar or worm from which it proceeded, in color and outward form. This chrysalis is furnished with the rudiments of legs and wings, but is incapable of locomotion. In this state, it does no injury, as it generally remains quiet and motionless, and takes no food whatever. After continuing a certain time in the pupa or chrysalis state, it again casts its skin and issues forth a perfect and full-grown moth, fly, or beetle, to deposit its eggs for future generations. The body of a caterpillar generally consists of a head and twelve segments, while that of the perfect insect is divided into three parts, the first of which is the head, the second the thorax, or chest, and the third the abdomen or body. The head is furnished with eyes, two jointed horns called antennæ, which differ much in various tribes, and a mouth formed either for biting, chewing, or sucking. The second part—the thorax, or chest—is furnished either with two or four wings. The legs, generally six in number, are fastened to the underside. The abdomen, or hind part, contains the organs of digestion and the piercer, or sting.

It is unnecessary here to enter into details or describe the several grand divisions into which insects are classed, as it would only perplex and be of no practical utility to the agriculturist, unless he intends to enter more minutely into the study of entomology. The principal thing desired is to be able to identify the species most injurious and beneficial to his crops, to know their habits, and repel or destroy those which are the most obnoxious, either in the larva, pupa or perfect state. Many of the most destructive insects being extremely small and apparently insignificant, the farmer can never judge from the size or appearance of any particular species as to its capability of inflicting injury on vegetation. The wheat-midge, Hessian fly, and joint-worm, which are so destructive to grain crops, are scarcely to be distinguished by the naked eye without particular observation, and the very minuteness of these insects causes their presence to be overlooked both by birds and man, until their ravages show where the destroyers have been after it is too late. In conclusion, were any farmer to study the habits and natural history of a single insect which destroys his crops, and, by so doing, discover a remedy to the evil that would lead to practical results, such a man should be honored by his countrymen, cherished and defended like the sacred soil upon which he dwells.

D. J. B.

INSECTS INJURIOUS AND BENEFICIAL TO VEGETATION.

BY TOWNEND GLOVER.

INSECTS INFESTING THE COTTON PLANT.

In visiting the plantations near Columbia, in South Carolina, in September last, for the purpose of examining the habits of the insects injurious to cotton, the first that attracted attention was the great number of cantharides, a species of blister fly, in the flowers of the plant,

feeding upon the nectar or pollen, and in many instances upon the petals themselves. These insects were similar in appearance to the striped potato fly, (*Cantharis vittata*, of Harris,) so destructive to the potato plant in the more Northern States. These, however, were much smaller in size than the Cantharis vittata, and rather different in markings and color. Several small cantharides of an ash or rusty greyish color, more or less marked with stripes, were also found devouring the petals at the same time.

A species of chauliognathus (*Chauliognathus pennsylvanicus*, of De Geer) was found in similar situations in great numbers, but did not appear to attack the petals like the above mentioned cantharides, and, as far as observed, contented itself with the nectar in the interior of the flowers.

A leaf beetle (*Galereuca duodecimpunctata*) devours holes in the petals also; but I imagine that none of these insects do much injury to the crops, unless it should be discovered that they pierce the embryo bolls, as several planters assert, although I never observed them in the act. The large green, thorny and poisonous caterpillar of the moth saturnia sometimes does considerable damage to the foliage of cotton plants during the latter part of August and the beginning of September. It also devours the leaf of the Indian corn. These caterpillars inflict very painful wounds with their spines if handled incautiously. As they do not appear to be very numerous, however, they probably injure the main crop only in a trifling degree. Shaking them off with a stick, and then trampling them under foot, appears to be the only method to destroy this caterpillar.

The much-dreaded cotton louse (*Aphis?*) was not found very abundantly at this late season, as the dry, hot weather of the past summer had been unfavorable to its increase; and it is mostly when the cotton plants are very young and tender, or during damp seasons, that the attack of these insects is mostly to be dreaded.

The boll-worm (*Heliothes?*) was not found to be very numerous. It generally does more damage to the crops further south or west. Several of these insects were found, however, on Mr. Moultrie Weston's plantation near Gadsden. Their presence was first indicated by the quantity of young bolls and buds which had fallen to the ground and were gradually withering under the plants. Each of these fallen bolls, upon examination, exhibited merely a small puncture on the outside. The inside, however, was either partially or wholly eaten out by the young worms and filled with fæces; but they were not to be found in the inside of these fallen bolls, as their instinct teaches them to escape in time before the boll falls. Whenever the neighboring plant was thoroughly searched, the worm was almost invariably found perforating another boll in a similar manner, or resting upon a leaf preparatory to casting its skin, which operation is performed several times before it attains its largest size. When a boll is attacked, the calyx "flares" open in so marked a manner that any experienced planter can determine at one glance such bolls as have been injured; but if the boll be very young, it almost invariably falls to the ground and withers. More damage appears to be done to the crop here by the destruction of these young bolls than is generally supposed, as they are scarcely observed when lying dried up upon the parched soil.

The caterpillar of a butterfly *(Argynnis columbina)* was found upon the cotton plant, but had evidently wandered away from its favorite food, which consists of the wild passion vine, or May pop (*Passiflora.*) These insects cannot do much, if any, injury to the cotton, as multitudes were afterwards found on the May pop, which is a very troublesome weed to eradicate, and grows profusely in and about the edges of plantations. In October and November, the so-called grass worm was very abundant in the cotton and grass lands near Columbus; but it has been stated by the best planters in that neighborhood, that it does trifling, if any damage to cotton; for if the grass and weeds are suffered to grow between the rows, the caterpillars will devour the grass in preference to the cotton. When very hungry, however, they will eat the cotton plant, as I reared about thirty of these insects on cotton leaves alone, although they appeared to prefer grass, if attainable. The perfect moth came out about the 28th of October.

A small green caterpillar of a yellowish brown moth *(Tortrix?)* was found, but not very abundantly, on the leaves, which it rolled up, and thus formed a secure retreat from its enemies, and only issued forth to feed upon the surrounding foliage. The yellowish hairy caterpillar of a species of arctia was also found feeding upon the leaves. The habits of this insect appear to be solitary, and as very few were found, the crop cannot be materially injured by them, at least in this part of the country. Many green smooth-skinned caterpillars of a moth, (*Plusia?*) about an inch in length, were found from the 12th of October to the 2d of November, feeding upon the "blooms" of cotton, in company with others, similar in color, and size, but distinguished by a longitudinal band of white on each side. The latter were likewise very destructive to the leaves of turnips, as stated by Mr. C. F. Peabody, of Columbus. Several very slender, brownish span-worms, about half an inch in length, were observed upon the "blooms" of cotton in September and October, but as these insects merely eat small holes in the petals, they cannot do much harm.

Another caterpillar, from about an inch to an inch and a half in length, and of a beautiful dark velvety appearance, with longitudinal yellow stripes, appeared to have the same habit of burrowing into the bolls in a similar manner as the so-called boll-worm, but was not sufficiently numerous to injure the crop.

A small beetle, *(Cetonia melancholica,)* of a greenish metallic cast, barred with dirty cream color, was found in the holes already pierced by the boll-worm, in September and October. These insects appeared merely to frequent such places for the extravasated sap, which exudes from the wounds previously inflicted by the worm. They were never observed actually boring into the bolls, but were very numerous in such places. As many as five were taken from one boll where the sap was flowing very freely.

Several insects (*Pentatoma* and *Anisoscelis*) were very abundant in the cotton fields, both on the bolls and leaves, which have been accused of piercing the young bolls for the sake of the juice; but as none were observed in the act, it cannot be stated definitely whether they actually do harm or not, before their habits have received further investigation.

The cotton louse (*Aphis?*) made its appearance again during the cold, damp weather of November, but too late to do much harm.

Among the insects observed to be beneficial to the planter was the lady-bird, (*Coccinella?*) plate 8, which, both in the lava and perfect state, devours myriads of cotton lice. The grub, or maggot-like larva, of the syrphus sucks out the juices of the plant lice, and thus destroys them.

The predatory larva of the lace-wing fly (*Hemerobius?*) also devours multitudes of these pests; and minute ichneumon flies deposit eggs in the bodies of the living aphis, or cotton louse, which, when hatched into grubs, eat out the interior substance of their bodies, and thus destroy them. Other ichneumon flies are ever busy on the wing in search of noxious caterpillars, in the bodies of which they desposit their eggs in a similar manner.

The tiger beetles (*Cicindela?*) and other beetles (*Carabus?*) are constantly roving about to seize and devour such other insects as may be so unfortunate as to happen to fall in their path; and thus has Nature kindly provided one class of insects to live entirely upon others, to keep the noxious ones in check and prevent their too rapid multiplication.

The ants which swarm upon cotton plants merely frequent them for the sake of the sweet sticky substance that is elaborated in the body of the aphis, or cotton louse, and afterwards is ejected upon the leaves, and forms their favorite food. Ants also prove beneficial in many other cases, as they destroy all weak or disabled insects they can overcome.

Spiders, too, are useful in destroying injurious insects on the cotton. Some spin their web from plant to plant, and thus entrap multitudes of unwary flies and moths; others, again, rove from leaf to leaf, hunting for insect food, upon which they spring with the unerring leap of a beast of prey. In short, almost all insects may be classed as either beneficial or prejudicial to agriculture, and all intelligent farmers and planters should be able to distinguish their friends from their foes. The former should be protected and encouraged by all the means in their power, whilst it is only by studying the habits and natural history of the others, that they may at length learn some effectual methods of destroying them either in the larva, pupa or perfect states. For, if we consider that one female "miller," or moth, produced early in the spring and allowed to deposit her eggs, is the mother of the myriads of ravenous caterpillars which in the late summer and fall devastate our fields and woods, the necessity of a closer study of her habits will at once be apparent to the most careless observer. The instincts of insects are various, some being attracted by fire or lights, others by sweets; many avoid certain substances; others, again, remain concealed all winter in the stalks of plants, and it is only until a thorough investigation has been made of their habits that any step can be taken effectually to destroy and exterminate them.

THE COTTON LOUSE.

When the cotton plant is very young and tender, it is particularly subject to the attacks of the cotton louse, (*Aphis?*) plate 3, which, by means of its piercer, penetrates through the outer coating, or paren-

chyma, of the leaf or tender shoots, and sucks the sap from the wound The under part of the leaves or young shoots are the places mostly selected, and the constant punctures, and consequent drainage of sap, enfeebles the plant, causing the leaf to curl up, turn yellow, and subsequently wither away and fall to the ground. The young lice are extremely minute and of a greenish color; but when they become older, they are about a tenth of an inch in length, and often of a dark green, or, in some instances, almost black. I fancy the color somewhat depends upon the health of the plant, as well as that of the insect, or, perhaps, upon the food, as I have seen green and black lice promiscuously feeding upon the same plants. The female produces her young alive during the summer, when she may often be seen surrounded by her numerous progeny, sucking the juice from the leaves and still producing young. Some naturalists state that the females, late in the fall, produce eggs for the future spring generation. If so, it is in order to preserve the species, as the insects themselves are easily killed by cold and frost; and their increase would be incalculable were it not that kind Nature has provided many enemies amongst the insect tribe to prevent their too rapid multiplication. Both males and females are said, at certain seasons, to possess wings, but the females and young in summer appear to be wingless. The end of the abdomen of both sexes is provided with two slender tubes, rising like horns from the back, from which exudes the "honey dew," or sweet gummy substance, seen sticking to the upper sides of the leaves beneath them, and which forms the favorite food of myriads of ants. Although young plants are mostly attacked, yet I have seen old "stands" in Georgia with their young shoots completely covered with this pest as late as November.

The principal insects that destroy the aphis are the lady-bird, the lace-fly, and the syrphus, all of which wage incessant war upon the lice and devour all they can find. Another fly, the ichneumon, likewise lays an egg in the body of the louse, which, hatching into a grub, devours the inside of the still living insect until it eventually dies, clinging to the leaf even in death, and the fly makes its appearance from the old skin of the aphis. A fuller description, however, of the enemies of the louse, together with figures, is given hereafter, plate 8. When old cotton plants are suffering from the attacks of the louse, many planters recommend the tops of such to be cut off and burned, and by so doing partially succeed in destroying them; yet, when we consider that by this method many young "blooms" and "forms" must likewise be destroyed, and prevented from maturing, it must be confessed that the remedy is almost as bad as the disease. In a garden or greenhouse, a solution of whale-oil soap, from a syringe, showered upon the upper and under parts of the foliage, has been used with much advantage; yet, upon the extended scale of a cotton plantation, such a remedy is altogether too trifling and impracticable, and until we can collect further information from intelligent planters upon this subject, we must rest content with the instinct of our insect allies.

THE BOLL-WORM.

The egg producing the boll-worm is deposited by a tawny yellowish-colored moth, or miller, *(Heliothes?)* plate 3, during the warm evenings in summer and fall, and may be seen hovering over the tops of the cotton blooms from about an hour before until an hour after sunset. This moth flits from flower to flower, depositing a single egg on each, which hatches in the course of three or four days, and the little caterpillar, or worm, immediately eats its way into the centre of the enclosed bloom, or boll, and after devouring the interior, escapes to a leaf, where it soon casts its skin. The ruined bloom in the meantime "flares" open and falls to the ground, and the young worm then attacks another bloom, or boll, in the same manner; and at length, as it acquires size and strength, it is enabled to bore into the nearly matured bolls, which are entirely destroyed by its punctures, as at this period, if the interior is not devoured, the rain penetrates the boll, and the cotton becomes rotten and useless. The caterpillar, after attaining its full size, descends into the earth, where it makes a silky cocoon, interwoven with particles of gravel and earth, in which it changes into a bright, chestnut-brown chrysalis. Those which went into the ground in September and October appeared as perfect moths about the end of November. Whenever a young bloom is seen in the field with the calyx spread open, it may be safely concluded that it has been attacked by the young boll-worm, and will soon perish and fall to the ground. If many of the fallen blooms are closely examined, they will mostly be found to have been previously pierced by this worm, or some other pest. Several intelligent planters have accused various other insects of piercing the young bolls, and thus causing them to fall; but during the short period of my sojourn, I could detect none in the act, except the boll-worm. There is a striking similarity between this and the corn-worm in appearance, food, and habits, both in the caterpillar and perfect state, which leads to the supposition that the boll-worm may be the young of the corn-worm moth, and the eggs deposited on the young bolls as the nearest substitute for green corn, and placed upon them only when the corn has become too old and hard for their food. This fact, however, has not as yet been fully proved, but can easily be done next season by any intelligent planter who will try the experiment. Colonel B. A. Sorsby, of Columbus, has bred both insects, and declares them to be the same; and moreover, when, according to his advice, the corn was carefully wormed, on two or three plantations, the boll-worms did not make their appearance that season on the cotton; notwithstanding on neighboring plantations they committed great ravages. The worms vary much in color and markings, some being brown, while others are almost green; all, however, are more or less spotted with black, and slightly covered with short hairs. These variations of color, perhaps, may be caused by the food of the caterpillars, which appear in every shade between the two. The chrysalis is of a bright chesnut-brown, and the moths of a tawny yellow color. The upper wings are yellowish in some specimens, with a shade of green, but in others red. There is an irregular dark band running across the wing, about one

eighth of an inch from the margin, and a crescent-shaped mark near the centre of the wing. Several dark spots, enclosing a white spot, are also discovered on the margin. The under wings are lighter colored, with a broad black border on the margin, and also veined distinctly with the same color. In the black border, however, there is a brownish-yellow spot, of the same color as the rest of the under wing, which is more distinct in some specimens than in others, but may always be plainly perceived.

It has been recommended to light fires in various parts of the plantations at the season when the first moths of this insect make their appearance, as they are attracted by light, and perish in great numbers in the flames; and if the first brood of females be thus destroyed, their numbers must necessarily be reduced, as it is highly probable that it is the second or third generation which does the principal damage to the crops. Some successful experiments in killing these moths with molasses and vinegar were made by Colonel Sorsby, a year or two since, which I will give in detail, in his own words: "We procured eighteen common-sized dinner plates, into which we put about a half a gill of vinegar and molasses, previously prepared, in the proportion of four parts of the former to one of the latter. These plates were set on small stakes, or polls, driven into the ground in the cotton field, with a six-inch square board tacked on top to receive the plate; each stake occupying an area of about three acres, and in height a little above the cotton plants. These arrangements were made in the evening, soon after the flies had made their appearance. When examined the next morning, we found from eighteen to thirty-five flies to each plate. We continued the experiment for five or six days, extending the plates over the entire field, each day's success decreasing until the number was reduced to two or three only to the plate, when it was abandoned as not being longer worthy of the trouble. The crop that year was but very little injured by the boll-worms. The flies were caught, in their eagerness to feed on the mixture, by alighting into it, when they were unable, from its adhesive nature, to make their escape. They were evidently attracted by the odor of the preparation—the vinegar, doubtless, being an important agent in the matter. As flies feed only at night, the plates should be visited late every evening, the insects taken out, and the vessels replenished, as circumstances may require. I have since tried the experiment, with results equally satisfactory, and shall continue it until a better and more economical one is adopted."

THE GRAIN MOTH.

The grain moth, (*Tinea?*)—plate 4, was first observed by me in South Carolina and Georgia in September last. It infests the corn-fields, where it is sheltered by the husk, and burrows between the grains, upon which it feeds, somewhat in the manner of the Angoumois moth, except that the kernels are more irregularly eaten. The cocoons are formed mostly between, or on the outside of the grains, when partially devoured. The first brood of moths appeared early in September; and as the caterpillars of this month produced perfect insects in October, it will be difficult to determine how many broods can be

brought forth during one season, in these warm climates. The caterpillar is about three-tenths of an inch in length, and of a pink or reddish hue. The cocoon, which is of an oval shape, is formed of fæces, particles of corn-dust, and silk, cemented together in or among the grains. The chrysalis remains in this case from ten to fourteen days, according to the state of the weather. The moths, which are very lively, when in a state of rest, place their upper wings together at an angle somewhat resembling the roof of a house, with the ends turned, as in the figure, plate 4. They measure, when expanded, not quite four-tenths of an inch from tip to tip, and are chestnut brown, mottled or marbled with darker brown, black, and yellow. The under wings are also brown, very narrow, and edged with a wide fringe of fine hairs.

No remedy can at present be suggested to guard against the attacks of these insects, until a more thorough investigation of their habits has been made. These worms also appear to attack corn out of the field as well as in. They are occasionally taken from decaying cotton bolls, which have been previously pierced by the boll-worm.

SYLVANUS QUADRICOLLIS.

When examining some ears of corn taken from a field in Georgia, in October last, many of the grains were observed to be loosened from the cob; and, upon a closer inspection, multitudes of minute beetles, (*Sylvanus quadricollis*)—plate 4, were discovered, hiding between the grains, between which their small size and flattened bodies allowed them to creep with ease. The eggs appeared to have been deposited beneath the kernel, near where they were fastened to the cob. The larvæ, when fully grown, measure about the eighth of an inch in length, are of a creamy white color, and covered with short hairs. They eat their way inside, leaving only a small hole to mark where they first effected entrance, the germs of the grain being first devoured, and then the white, starchy substance, sometimes more than half the interior being eaten out. The pupa I have not yet seen. The beetles are about an eighth of an inch in length, of a bright chestnut brown, and may be found in the inside of the grains feeding upon the starch, as indicated above. They are very numerous, as many as six or eight being sometimes taken from a single grain. Corn thus injured can have but little chance of germinating, as the germ is almost always first destroyed. This fact perhaps may, in some degree, account for the numerous failures of seed corn to grow, of which Southern planters so often complain; the subject is worthy of further investigation. The larvæ and perfect insects were found inhabiting the same ears, as late as October.

As a remedy, kiln-drying might be tried with advantage, where the corn is intended to be used for food alone; but, if required for seed, such a process would totally destroy the germinating powers. Quicklime has also been recommended, by some, to be strewn between the layers of corn; but, until the results of practical experiment by the farmers themselves are made known, nothing can be positively recommended.

THE BILL-BUG, OR CORN-BORER.

The insect "bill-bug," or "corn-borer," (*Sphenophorus?*)—plate 4, is from four to six-tenths of an inch in length, and of a reddish-brown or reddish-black color. The head is furnished with a long trunk, or bill, hence its common name. It is very destructive to corn in many parts of the South and Southwest, and was brought for examination by Senator Evans, where he states it is very injurious to the crops on the Pedee river. He says: "The perfect insect eats into the stalk of the corn, either below or just at the surface of the ground, where it deposits its egg. After changing into a grub, the insect remains in the stalk, devouring the substance, until it transforms into the pupa state, which occurs in the same cavity in the stalk occupied by the grub. It makes its appearance the following spring in the perfect state, again to deposit its eggs at the foot of the young corn plants. These insects destroy the main stem, or shoots, thus causing suckers to spring up, which usually produce no grain, or, if any, of very inferior quality to that of the general yield. Swamp lands or low grounds are the places most generally attacked."

General Fitzpatrick, of Alabama, and Colonel Pitchlynn, chief of the Choctaw nation, both corroborate the statement, in saying that they are very destructive in Alabama, and on the Red river, in Arkansas, but that the planters have greatly diminished their numbers by pulling up the roots of the corn after the crop has been housed, piling them up in heaps, and burning the whole mass. Perhaps quick-lime, applied in layers to the corn-stalks and roots, would destroy them as the heaps heat and decompose, which would be particularly useful where lime is required for the soil as a manure. By these means, the unhatched pupæ in the corn would be consumed. A very perceptible decrease of the bill-bug has been observed where the practice of burning the roots has been followed, and, if persevered in, might nearly eradicate them in the course of a few years. At the same time, the wild plants they infest should be discovered, and also destroyed in a similar manner as above.

THE ANGOUMOIS MOTH.

The larva of this moth (*Anacampsis cerealella*)—plate 4, eats the interior substance of corn, wheat, and other grains, when stored in granaries, and also in the South in the open field. The grub, when fully grown, is about a quarter of an inch in length. If taken from wheat, it is somewhat smaller than when bred in corn. The color is yellowish white. It spins a thread, by which it is able to suspend itself if disturbed. When the larva has ceased to feed it makes a cocoon of whitish silk in the cavity previously made, having fed upon the interior substance of the corn. The excrements are left at the bottom of the compartment. The pupa is of an amber color when young, but afterwards becomes dark brown as it advances in age. The perfect moth, when expanded, measures about six-tenths of an inch across the wings. In the largest specimen bred from corn it makes its way out of the grain through a small round hole which had been previously knawed

through the outer skin in the larva state. The upper wings are long and narrow, of a yellowish-grey, satin like in lustre, and fringed with long hairs at their extremities. There is a dark spot on the centre of each wing, and another near their tips, but some have more or less black marks on the wings, and several specimens have black spots near the margin. These markings, however, appear to be extremely variable. The under wings are long, narrow, and pointed at the upper extremity, of a leaden color, and thickly fringed with hairs. Several of the moths examined were much smaller than the rest, but this may in some measure be attributed to their food. Those issuing from grains of wheat are much smaller than those which fly about maize, or Indian corn. Dr. Harris, of Harvard University, in his most valuable "Report on the Insects of Massachusetts Injurious to Vegetation," states that the female lays from sixty to ninety eggs, and in from four to six days the minute worms appear, which disperse, each one selecting for itself a single grain, generally burrowing into it where the plumule comes forth. These grubs are of a white color, inclining to yellow. The insects of the first brood come to maturity in about three weeks, remain but a short time in the chrysalis state, and appear as the perfect moth in autumn. In a close room, I have observed the moths to come out at almost all times of the year except in the dead of winter, and even then if placed near a stove.

Reaumur says: "The moths of the second brood remain in the grain all winter." As early as 1768, Colonel Landon Carta, of Virginia, communicated to the Philosophical Society at Philadelphia, some "Observations on the Fly Insect that injures Wheat;" and the committee of industry stated that "it was said the injury of wheat by these flies began in North Carolina about forty years before." M. Louis A. G. Bosc, who was sent by the French government in 1796, stated that "they were so abundant in North Carolina as to extinguish a candle when he entered his granary at night." This leads to the inquiry whether they might not be diminished or destroyed in the moth state when in granaries, by placing a lighted lantern in a cask smeared on the inside with tar, molasses, or some similar adhesive substance.

Dr. Brincklé, of Philadelphia, states that this insect sometimes attacks growing wheat; and I have observed them in Georgia flying about the corn or maize-fields in November, depositing their eggs in the ears. These moths, however, had probably been bred in an old corn shed which stood in the middle of the field, and literally swarmed with them both inside and out.

As a remedy to the attacks of this insect it has been recommended by some farmers to leave the corn in the husk, as the ends are then only liable to be injured. Others place the corn in heaps until they have become heated, and thus have partially succeeded in destroying them. Kiln-drying, at a heat of 176° of Fahrenheit, will kill them, but at the same time render the corn useless for seed, as the germinating power is then destroyed. Several farmers have succeeded by placing their grain in casks previously heated and fumigated with charcoal. From some experiments of my own, I find that the perfect insects of Angoumois moth, weevil, and pea-bug, can readily be killed when confined in closed vessels infused with the fumes of chloroform. A very

small quantity dropped into a bottle infested with these insects and then corked, the vapor in a few minutes deprives them of life. This, however, does not appear to have much effect upon the eggs, unless it could be retained until they have hatched. Chloroform is merely mentioned here, as perhaps it may lead to more practical results as an agent for the destruction of various other insects in closed vessels or casks. The fumes of ether have also been employed with similar success. I do not know but in some classes of seeds that their vitality might be destroyed by these agents. Therefore caution should be used in their application.

THE CORN-WORM.

The corn-worm, (*Heliothes?*)—plate 4, is produced from an egg deposited as early as June by a yellowish-colored moth, either in the silk or upon the apex of the ear of corn, when in the milky state; and as it appears to be incapable of feeding upon the grain when once hardened, it is mostly found upon such as are termed "roasting ears." The worm, or caterpillar, at first almost imperceptible, increases in size with great rapidity. It securely shelters itself by the husk from the sun and rain, and feeds with great voracity upon the milky and tender grains at the end of the cob. The destruction caused by this insect is much greater than has generally been supposed, especially in South Carolina and Georgia, where, out of several fields examined, scarcely one was found in which every third or fourth plant was not more or less injured. The worms, when fully grown, are about half an inch in length, and vary much in color and markings—some being brown, others green, striped with brown, and of all the intermediate shades. The body is sparingly clothed with short hairs, which rise from numerous black spots, or warts, on each segment; and on each side is a yellow, or lighter colored, longitudinal stripe. The younger caterpillars are of a reddish color, and similarly striped, and marked with numerous black spots; and it must here be remarked that there is a striking resemblance between the boll-worms and these caterpillars, which leads to the supposition that they ultimately prove to be the same insect, altered in color by the food upon which they feed. Experiments strengthen this supposition; as several worms, taken from the bolls of a cotton plant, placed in confinement with fresh bolls and an ear of corn in the milky state, simultaneously deserted the bolls, and eagerly commenced to feast upon the corn, as a nutriment more adapted to their taste. After casting and renewing their skins several times, when they have attained their largest size, they cease feeding, desert the ear, and descend by the plant into the earth, where, by constantly twisting their bodies back and forth, they work out a cavity, adapted to their size, of an oval shape. By glueing together the particles of earth with a viscid gum, or silk, which issues from the mouth, they form a rough cocoon, in which the caterpillar sheds its last skin, and changes into a shining brown chrysalis. This, in the early broods, changes again into the moth, or "miller," in the course of a few weeks.

The moth measures about an inch and a half across the expanded

wings, which are of a tawny yellow color; the upper pair are banded with two or more bars or rows of spots, and have a crescent-shaped dark mark near the centre. The under wings are somewhat lighter in color, and are distinguished by a broad band of dark brown, or black, extending along the outer margin, which always encloses an irregular shaped spot of yellow, the same as the rest of the wing. There is, likewise, a dark spot in the centre; and the nerves are black, or dark colored.

The great object to be attained at the present time is, to find out and adopt some feasible method of destroying the early and less numerous broods in the perfect or moth state, as it is entirely from these early so-called "millers" that the immense multitudes are generated, which commit such ravages on the crops. This is evident; for, if we consider that should two perfect female moths be allowed to deposit each two hundred eggs in safety, the third generation, if undisturbed, would amount to the immense number of forty thousand caterpillars. The devastation these insects would cause can be better imagined than described, especially were they also allowed to deposit their eggs in safety. Happily, however, Nature has provided them with many natural enemies, as the ichneumon fly and birds which destroy immense numbers. The tawny yellow moths, which are seen hovering on the wing about the tops of the cotton fields in July, August, and September, from early dusk to about an hour after sunset, are by many intelligent planters suspected to be the same as the corn-moth. This may or may not be the case, however, as at this period the corn is too hard for the young caterpillar to devour; and the young bolls being tender and succulent, together with the usual rotation of cotton, corn, and fallow, in most cases planted close to each other in the same field, might also favor the supposition. As yet, it is a mere matter of conjecture, which cannot be perfectly solved this season. Mr. C. F. Peabody, of Columbus, brought several of the worms he had found in his green corn to me in October, which certainly could not be distinguished from boll-worms of the same age. These were carefully fed until they changed into chrysalides, which also resembled the boll-worm and chrysalis as well in shape and color, and in the habit of forming the cocoon in the earth. I was unable, however, to establish their identity, owing to their being accidentally destroyed, but trust some intelligent planter will try the experiment more successfully another season, and thus settle the much-disputed question, "Are the corn caterpillar and the boll-worm the same insect?"

The ends of ears of corn, when partially devoured and left by this worm, afford a secure retreat for hundreds of small insects, which, under cover of the husk, finish the work of destruction, commenced by the worm eating holes in the grain, or loosening them from the cob. A species of greenish-brown mould, or fungus, grows likewise in such places, as the dampness from the exuded sap favors such a growth. Thus decay and destruction rapidly progress, hidden by the husk from the eye of the unsuspecting planter. It has been stated that the corn-worm does much more damage in dry seasons owing to the tassel, or silk, making its appearance at irregular intervals. The young worm devours the ends of this near the crown of the ear, and consequently

leaves many spaces vacant where the communication between the silk and the unimpregnated germ is thus cut off from the supply of pollen necessary to perfect the seed. Several of these worms were taken by Mr. Peabody as late as October from ears of late-planted corn.

The best mode to extirpate these insects would be to devise some such method of destroying the first brood of the perfect moths before the eggs are deposited, either by means of lights, or the vinegar and molasses on plates, as suggested by Colonel Sorsby on page 65.

THE RICE WEEVIL.

The rice weevil (*Calandra oryzæ*,)—plate 5, is said to attack rice when in the field, and as it does not confine itself to this grain alone, but also destroys wheat and corn when stored, it is one of the greatest pests to the farmer of the South. This weevil, which resembles the grain-weevil, (*Calandra granaria*,) in size, shape, and color, must not be confounded with the so-called red weevil of Ohio and other parts of the west, which is the larva of a two-winged gnat or fly, properly called the wheat-midge (*Cecidomyia tritici.*) This fly attacks wheat only when in the flower or immature state; whereas the true weevils are beetles, furnished with hard wing-cases, and long slender snouts, with which they attack grain or corn, only when ripened and hard. The female having deposited a single egg on each grain, the young larvæ immediately commence the work of destruction by eating into it, which serves afterwards as food and habitation for the small worm. In this cavity, it changes into a pupa, and in a short time the perfect weevil works its way through the thin skin to eat more holes in the grain and deposit eggs for another generation. The larva is a small grub about one-tenth of an inch in length, unprovided with legs, and is thicker in the middle than elsewhere; the tail tapers suddenly and is somewhat turned back when in a state of rest; the head is of an amber color, the body creamy yellow, and the grub generally appears in a curved posture. The pupa is also of the same creamy yellow color, and has the legs, wing-cases, antennæ, and trunk, of the perfect insect distinctly marked; but it is incapable of locomotion. The weevil is of a dark reddish brown, with two orange marks or spots, on each wing-case; the head is furnished with a long, curved, slender trunk, provided with jaws at its extremity, and with which it is enabled to pierce the grain. The wing-cases do not reach the end of the abdomen, but leave part of it uncovered. These insects manifested their destructive propensities in the United States Patent Office, by attacking corn, rice, hemp, and wheat indiscriminately, and was found to be particularly abundant in rice and wheat imported from China, most of which was valueless, and had to be burnt to destroy them; almost all the seeds imported from China were much injured by insects, although packed in tin cans.

The best remedy, when the wheat or corn is intended for food, would be to kiln-dry it, or if intended for seed, to fumigate in some confined place with burning charcoal, after closing all the apertures by which air can obtain access. Putting the grain also into casks heated and fumi-

gated with burning charcoal by means of a portable furnace, or storing it in layers with lime, has been recommended.

These rice weevils were very abundant in November, in Georgia, in a corn-field, burrowing under the husks to deposite their eggs. Multitudes of the Angoumois moth were also flying about an old shed at the same time and attacking the corn in the field. Samples of wheat or any other grain may be preserved in bottles or air-tight cases, uninjured by any insect enemies, by merely putting a few drops of chloroform into them and then corking them tightly, as has been suggested in the article on the Angoumois moth.

THE ANOBIUM PANICEUM.

An insect known to entomologists by the name of *Anobium paniceum*, (plate 5,) was observed by me in a soft wheat, (blé tendré,) sent by the French government, from Algeria. Hundreds of the larvæ, pupæ, and perfect insects were found in the same box, in July last, and the wheat appeared to be destroyed, in a similar manner as when infested with the wheat weevil, *(Calandra granaria,)* except that several larvæ were sometimes found inhabiting the same grain. They were of a creamy white color, and measured about the tenth of an inch in length, furnished with six jointed fore-legs. Their bodies were sometimes hairy and generally lay in a curved position. The pupæ were also of a creamy white, the perfect insect measuring about the tenth of an inch in length, with a thorax very large, and protruding so much as to conceal the head, when the insect was disturbed. The wing-cases were observed to be longitudinally marked with depressed dotted lines, and covered with short, yellowish down, the whole insect being of a reddish brown.

Should it increase so as to do much damage to grain, the same remedies can be used as have been recommended for the rice weevil *(Calandra oryzæ.)*

THE HESSIAN FLY.

The following account of the Hessian fly, *(Cecidomyia destructor,)*—plate 5, is condensed from Dr. Harris' Treatise on the Insects of New England, Injurious to Vegetation. This insect was first observed in the year 1776, in the neighborhood of Sir William Howe's debarkation on Staten Island, and at Flatbush on the west end of Long Island, New York. It is properly a small, two-winged gnat, which lays its eggs in winter or fall in wheat, when the grain has sprouted and begins to show leaves.

According to the account of Mr. Edward Tilghman, of Queen Ann county, Maryland, the eggs are deposited in October, in the longitudinal cavities between the little ridges of the blade, from which, in about fifteen days very small worms or maggots appear. They make way down the blades with considerable activity until hidden between them and the stems of the plants. Mr. Herrick, in the "Connecticut Farmer," says: "I have repeatedly, both in autumn and spring, seen the Hessian fly in the act of depositing eggs on wheat. The number on a single leaf is often twenty or thirty, and sometimes much greater." The eggs are extremely minute, and of a pale-red color; and if the weather

prove favorable they will hatch in four days. The maggots, when they first come out of their shells, are also of a pale-red color. Forthwith they crawl down the leaves and work their way between them and the main stalk, passing downwards till they come to a joint, just above which they remain, a little below the surface of the ground, with the head towards the root of the plant. Having thus fixed themselves upon the stalk, they become stationary, and never move from the place before their transformations are completed. They do not eat the stalk, neither do they penetrate within it, as some persons have supposed, but lie lengthwise on its surface, covered by the lower part of the leaves, and are wholly nourished by the sap, which they appear to take by suction. They soon lose their reddish color, turn pale, and will be found to be clouded with whitish spots, and through their transparent skins a greenish stripe may be seen in the middle of their bodies. As they increase in size and grow plump and firm, they become imbedded in the side of the stem by the pressure of their bodies upon the growing plant. One maggot thus placed seldom destroys the plant; but when two or three are fixed in this manner around the stem, they weaken and impoverish it, and cause it to fall down, or wither and die. They usually come to their full size in five or six weeks, and then measure about three-twentieths of an inch in length. Their skins now gradually harden, become brownish, and soon change to a bright chestnut color, which change usually happens about the first of December. The insect, in this form, has been commonly likened to flax-seed; hence many observers speak of this as the "flax-seed state." In two or three weeks after this change of color, the insect within becomes entirely detached from the old larva skin, and lies within it a motionless grub. The process of growth on, and some time after, on opening the leathery maggot skin, now a puparium, you find the pupa so far advanced that some of the members of the future fly are discernible through the scarf, which envelopes and fetters it on all sides. Within this shell, (the flax-seed case,) the pupa gradually advances to the winged state until the end of April or beginning of May, when the flies make their escape by breaking through one end of the shell. The body of the Hessian fly measures about the tenth of an inch in length, the head, antennæ, and thorax are black, the hind body tawny, more or less widely marked with black on each wing, and clothed with fine greyish hairs. The wings expand about a quarter of an inch or more, and are blackish, except at the base, where they are tawny and very narrow. They are fringed with short hairs, and rounded at the tip. The legs are pale red or brownish, and the feet black. The antennæ are jointed, and surrounded with whorls of short hairs. The flies, which come out in spring, lay their eggs on the leaves both of fall and spring-sown wheat. The maggots hatched from these, in New England, become stationary, and take the flax-seed state in June or July. They are generally transformed to flies in the autumn. According to Mr. James Worth, of Sharon, Pennsylvania, the second brood of flies, which appears early in June, has been entirely overlooked or confounded with the spring brood. He remarks that there are three complete broods, and partially a fourth in one season.

The Hessian fly is subject to the attacks of several parasitic insects,

which serve more or less to lessen their numbers, the chief of which is the Ceraphron destructor, of Say, a shining black four-winged fly, about one-tenth of an inch in length. This fact is merely mentioned here, as it has often been mistaken for the true Hessian fly, from being seen in wheat-fields in vast numbers, and known to come out of the dried larva skin of that fly, which, however, it had previously destroyed.

Mr. Herrick recommends that the stouter varieties of wheat should be chosen, and the ground kept in good condition. If fall wheat is sown late, some of the eggs will be avoided, but the risk of winter-killing will be incurred. Cattle or sheep, permitted to graze the wheat-fields during the fall will devour many of these eggs. Burning the stubble immediately after harvest, and then ploughing and harrowing the land, is also highly recommended. Steeping the grain and rolling it in air-slacked lime or plaster, as promoting a rapid and vigorous growth, would also be beneficial.

THE WHEAT-MIDGE.

The wheat-midge (*Cecidomyia tritici*,)—plate 5, according to Dr. Harris, is a small yellow two-winged fly, very much resembling a mosquito in form, but much smaller in size. It is stated to have been first seen in America about the year 1828, in the northern part of Vermont and on the borders of Lower Canada. The parent fly deposits her eggs in the beginning of July, in the opening flowers of the grain, or when the wheat is still in the milky state. The eggs hatch in about eight days, when the little yellow maggots, or worms, may be found within the chaffy scales of the grain. The seed scales of grass also sometimes serve as a shelter for these depredators. The worms, which are of a bright yellow or orange color, do not exceed an eighth of an inch in length, and are often much smaller. I have seen as many as twelve within the chaff of one single grain, sent to the Patent Office from Ohio. These maggots prey upon the wheat when only in a milky state. When they begin their depredations, soon after the blossoming of the plant, they do the greatest injury, as the grains never fill out. Towards the last of July or beginning of August, the full-grown maggots cease eating, and become sluggish and torpid, preparatory to shedding their skins, which takes place in the following manner: The body of the maggot gradually shrinks in length within its skin, and becomes more flattened and less pointed, as readily may be seen through its delicate transparency. This torpid state lasts only a few days, after which the insect casts its skin, leaving the latter entire, except a little rent at one end of it. These empty cases, or skins, may be found in great abundance in the wheat ears, after the moulting process is completed. Mr. J. W. Dawson, of Pictou, Nova Scotia, says that sometimes the maggot descends from the plants and moults on the surface of the ground. After shedding this skin, it recovers its activity and writhes about as at first, but takes no food. It is shorter, somewhat flattened, and more obtuse than before, and is of a deeper yellow color, with an oblong greenish spot in the middle of the body. Within two or three days after moulting, the maggots either descend of their own accord or are shaken out of the ears by the wind, and fall to the

ground. They do not let themselves down by threads, as has been supposed by some, for they are not able to spin. Nearly all of them disappear before the middle of August, and they are rarely found in the grain at the time of harvest. Hon. William D. Lindsley, of Sandusky city, Ohio, however, sent me several specimens of wheat with this insect in it as late as the beginning of August. From observations and remarks made by intelligent farmers, it appears that the descent of these insects is facilitated by falling rain and heavy dews. Having reached the ground, the maggots soon burrow under the surface, sometimes to the depth of an inch, those which have not moulted casting their skins before entering the earth. Here they remain without further change through the following winter. It is not usually before June that they are transformed to pupæ, this change being effected without another moulting of the skin. This pupa state lasts but a short time, a week or two at most, and in many cases only a few days. Under the most favorable circumstances, the pupa works its way to the surface before liberating the included fly, and when the insect has taken wing, the empty pupa shell, or skin, will be seen protruding from the ground. In other cases, the fly issues from its pupa skin in the earth, and comes to the surface with flabby wings, which soon expand and dry on exposure to the air. This last change occurs mostly in the months of June and July, when great numbers of the flies have been seen apparently coming from the ground in fields where grain was raised the year before.

The wheat-midge, or fly, "is a small orange-colored gnat, with long slender pale-yellow legs, and two transparent wings reflecting the tints of the rainbow and fringed with delicate hairs. Its eyes are black and prominent; its face and feelers yellow; its antennæ long and blackish. Those of the male are twice as long as the body and consist of twenty-four joints which, except the two basal ones, are globular, surrounded by hairs, and connected by slender portions like beads on a string. The antennæ of the female are about as long as the body, and consist of only twelve joints, which, except at the base, are oblong-oval, somewhat narrowed in the middle, and surrounded by two whorls of hairs. These insects vary much in size. The largest females do not exceed one-tenth of an inch in length, and many are found towards the end of the season less than half this length. The males are usually rather smaller than the females, and somewhat paler in color." Mr. Lindsley sent several of these insects to the Patent Office in August last, and stated that they have been extremely destructive in several parts of his district last year, (1854,) and that in some places the cattle were turned into the field in order to eat them and what little was left of the grain, the main crop not being worth the trouble and expense of harvesting. These flies are likewise said to be much more numerous and destructive on the edges of fields than in the centre, and in some cases when the edges were completely worthless, the centre bore comparatively a good crop.

Fumigation with sulphur and burning weeds on the windward side of the field, when the grain is in blossom, has been recommended. Air-slacked lime or wood ashes, strewn over the grain when in blossom, in the proportion of one bushel of lime or ashes, to be scattered over

the field when the plants are wet with dew or rain. Two or three applications have sometimes been found necessary. Ploughing up the ground also to destroy the maggots and the dust-chaff, or refuse straw, if found to contain any of these insects, should be immediately burned. In those parts of New England where these insects have done the greatest injury, according to Dr. Harris, the cultivation of fall-sown or winter-grain has been given up, and this for some years to come will be the safest course.

THE JOINT-WORM.

The joint-worm, *(Eurytoma hordei)*—plate 5, now committing such ravages in the wheat fields of Virginia, is a small, black, four-winged fly, about an eighth of an inch in length. The female lays several eggs in the outer sheath of the stalk, above the joints. After they hatch, the worms commence feeding within the sheath, and the constant irritation produced by them, forms a woody gall, or rather succession of galls, in the cavity of each of which lies a small, footless maggot, about the seventh or eighth of an inch in length, having a body with thirteen segments, and of a pale, glossy, yellowish color. The number of worms in each cluster of galls varies from four to ten, or even more. The substance of the stalk attacked becomes brittle, and either partially or entirely fills its central cavity, and frequently distorts it into various irregular shapes. I have often observed young rootlets putting out immediately below a joint thus affected. The worms on the stalks of wheat, when examined in February last, were yet in the larva, but early in March several had assumed the pupa state. They were about an eighth of an inch in length, of a pale-yellow color, which, as the pupæ were near coming out, became afterwards nearly black. These pupæ had the rudiments of wings, legs, and antennæ, as in the perfect fly, but were motionless. Late in April and the beginning of May, the flies made their appearance through holes gnawed through the tough, woody covering, of the gall-like excrescence in which they had passed the winter. This transformation, however, took place in a warm room. These flies are about an eighth of an inch in length, of a black color, the knees, joints, and feet, being tinged with yellow. The males, according to Dr. Harris, vary from the females by being smaller, and in having no piercers. The joints of the antennæ are likewise longer, and surrounded with whorls of little hairs. The hind body is shorter, less pointed at the extremity, and is connected with the thorax by a longer stem. He also says, that among fifteen females only one male was found. This corresponds with what I have observed, as out of sixty to eighty joint-worm flies, produced from diseased stalks of wheat, I only procured one male, answering to his description, and eight parasites not quite a tenth of an inch in length, of a dark metallic shade, with yellow legs. They were marked with dark color, and the antennæ much thicker at the end. These flies were furnished with four transparent, dotted wings. If the small insect figured in plate 5 is the male, it is somewhat incomprehensible how it happens that so many females appear at the same time without more males.

Another four-winged fly also made its appearance from the same

stalks of about an eigth of an inch in length, with an abdomen and legs of a bright yellow. The head and thorax were of a dark color, and somewhat metallic lustre. The wings were transparent, dotted, and fringed with short hairs, and the piercer reached to the middle of the under part of the abdomen.

Dr. Harris states that it has been found in Massachusetts, that ploughing in the stubble has no effect upon the insects, which remain alive and uninjured under the slight covering of earth, and easily make their way to the surface, when they have completed their transformation. A free use of manure and thorough tillage by promoting a rapid and vigorous growth of the plant, may render it less liable to suffer from the attacks of the insect. It has been stated that this fly, like the wheat midge, does more injury on the edges of the fields than in the middle.

At the Joint-Worm Convention, held at Warrenton, Virginia, in 1854, the following was recommended: Prepare well the land intended for wheat, and sow it in the beginning of autumn, with the earliest and most thrifty and hardy varieties, and do nothing to retard the ripening of the crop, by grazing or otherwise. Use guano or some other fertilizer liberally, particularly when seeding corn-land or stubble. Burn the stubble on every field of wheat, rye, or oats, and all thickets or other harbors of vegetable growth, contiguous to the crop. Sow the wheat in as large bodies, and in as compact forms as practicable; and, if possible, neighbors should arrange amongst themselves to sow adjoining fields the same year. Feed all the wheat, or other straw, which may be infected, in racks or pens, or on confined spots; and in April set fire to all refuse fragments about the racks; and on or before the first of May carefully burn all the straw which has not been fed. The refuse of wheat, such as screenings, &c., should also be destroyed, as the pupa case is hard, and not easily softened by dampness or wet.

THE VINE-HOPPER.

The vine-hopper, (*Tettigonia?*)—plate 6, is very destructive to the grape-vine, I observed in Washington, in June, July, and August last, in great abundance. The leaves were entirely covered with the living flies, and the cast skins of the larvæ. The insect, in the first state, is unprovided with wings, and sucks the sap, or juice, from the leaves, by means of a piercer, or beak, which causes them to turn yellow, and assume a blotched or scorched appearance. The outer skin is cast several times before the insect attains the full size, which it does about the end of July or beginning of August, in the mean time constantly puncturing the leaves and draining the sap from the plant. When fully grown, it is provided with four wings, and jumps with great activity, if disturbed, or takes to flight sometimes in such multitudes as greatly to annoy the persons passing. It has been asserted that these insects remain all winter under leaves, roots, or tufts of grass; and in the spring crawl out, only to deposit their eggs on the vines, and then die. These vine-hoppers appeared to be different from the Tetigonia vitis, described by Dr. Harris, and were of two colors, the one yellow with transparent yellowish wings, marked with three or four dark spots on each upper wing, and the other, of a blood-red color,

shaded and marked with red and brownish orange. The upper wings also had not the same transparent appearance, but were marbled with dark, brownish black.

Dr. Harris recommends fumigation with tobacco, under a moveable tent, to check the ravages of the vine-hopper, but such a remedy would not answer for the extensive vineyards of the West, and the vine-growers should make experiments until some cheap and practical remedy can be discovered and made known.

THE AMERICAN PROCRIS.

The caterpillars of the *Procris americana*—(plate 6,) I also observed to be very destructive to the foliage of grape-vines, in Washington, in August and September of the past year, and injured them to such a degree that the leaves appeared as if scorched by fire. The larvæ are found in companies of several together underneath the leaves, and feed together side by side upon the substance, leaving only the stalk and large ribs untouched. The eggs are deposited in clusters, and the caterpillars are from five to six-tenths of an inch in length, covered with short hairs, which are longer on the second and last segments. They are of a yellow color, spotted on each wing with distinct black spots, and attain their growth in twelve or fourteen days. In Massachusetts, there are only two broods of this insect in a season, but in the neighborhood of Washington there appear to be several. The cocoons, which are of an oblong-oval, flattened shape, are tough, and of a whitish color. They are formed in crevices and under the leaves. The chrysalis is flattened in shape, of a chesnut-brown color, and in the first broods changes into the perfect insect in the course of a few days. The moths measure about nine-tenths of an inch across the expanded wings, and are entirely of a blue-black color, except the collar, which is orange.

The caterpillars may be destroyed by syringing the leaves with a solution of whale-oil soap, and then trampling under foot those which fall to the ground, or by picking off the infested leaves by hand, when not too numerous. In reference to this subject, it might be well to mention that the French have a method of destroying small moths in their gardens by the use of cords dipped in honey, and stretched from tree to tree. These cords at the same time attract the insect by their sweetness, and entrap them from their adhesiveness.

THE DESMIA MACULALIS.

The moth of the (*Desmia maculalis*)—plate 6, was brought to me by Mr. Joshua Pierce, of Washington, in the District of Columbia, and was stated by him to be very destructive to the foliage of his grape-vines in his green-house. I also found it very abundant in the grapery of Mr. Lyons, in Columbia, South Carolina. It was likewise taken in the open air at Atlanta, in Georgia. This insect, at present appears to confine its ravages principally to vineries under glass, but no doubt will spead over the vines out of doors if not checked, as the larvæ were found upon the Isabella and Catawba vines in open gardens. The

caterpillar is about nine-tenths of an inch in length, of a green color, with a black semi-circle on the first, and two or more black spots on the second segment of the body. It is very lively, and when disturbed backs out of its shelter, which is made first by rolling and then fastening the outer edge of the leaf with silk, and suspends itself by a thread from the leaf. The chrysalides were formed under shelter of a portion of the leaf fastened with silk to another leaf or the side of the box in which they were confined. These chrysalides were about half an inch in length; at first orange color, which afterwards changed to a brown. The tail, when magnified, appeared to be furnished with seven or eight curved hooks to enable the chrysalis to hold fast to the floss forming the cell. The perfect moth measured about an inch across the wings. The female had two distinct white spots on a black ground on each upper and under wing, two white bands round the abdomen, and a white border around each wing, with a line of black through the centre. The male had two white spots on each upper wing, with a semi-lunar mark of white on the outside of each spot. The under wing had only one long spot of white on each with a similar lunar white mark under it. The margin was the same as in the female. The tail was also white. The antennæ of the male, however, were very singular, being clubbed in the middle.

These moths were very troublesome in July, August, and September, and may be still more so, if proper precautions are not taken to destroy them, by plucking off and trampling on each infected leaf, which may easily be recognized by its rolled up appearance.

THE SPOTTED PELIDNOTA.

The spotted pelidnota, *(Pelidnota punctata,)*—plate 6, destroys the leaves of grape-vines in July and September, and has been suspected by many farmers of being the cause of the immature clusters of grape which are found in many of the bunches, the stem or branch on which the unripe grapes appear, being girdled by some insect. The fruit does not ripen, but remains perfectly green, while the rest of the bunch is of a deep purple. A quantity of such immature grapes was found upon the Isabella and Catawba, in 1853, in New York, and although the vines were thoroughly searched no insects except these beetles could be discovered. Dr. Harris states that the hog caterpillar, Chœrocampa pampinatrix, cuts off unripe grapes; but as no such caterpillars were found, it would be well to have the matter further investigated. The beetles are about an inch in length, and of a brownish-yellow color, with three distinct black spots on each wing-case, and two on the thorax. They fly with a loud humming sound, and are found during the day time clinging to the leaves. The larvæ are said to feed on rotten wood, and it is only in the perfect or beetle state that they do any harm to the vines.

The remedy which has been recommended is to take them off by hand and crush them under foot, as they are large enough to be plainly seen when feeding on the leaves.

THE PLANT LOUSE.

The plant louse, *(Aphis?)*—plate 6, is very destructive to young

shoots and leaves of grape-vines, as they suck out the sap by means of a piercer, or trunk, and thus enfeeble the system of the plant. The natural history of these insects is so similar to that of the cotton louse before described, as to render it unnecessary to enter into further detail here but refer to the article on that insect. Their natural enemies are also the same, as they are destroyed by the lady-bird, the lace-wing fly, and the syrphus, for a fuller description of which refer to the article on insects beneficial to the agriculturists delineated on plate 8. I must here, however, remark that the minute ichneumon fly which destroys the aphis on grape-vines differs essentially from that on the cotton louse, although its general form and habits are the same.

When the vines are in small gardens, the best remedy to destroy this pest would be to syringe the plants thoroughly, both on the upper and lower sides of the foliage with a solution of whale-oil soap. Dusting the leaves with lime has also been recommended, and in a green-house, these lice can be destroyed by a thorough fumigation with the smoke of tobacco.

THE GRAPE-VINE BORER.

The grape-vine borer, *(Ægeria polistæformis,)* plate 6, was sent to the agricultural rooms of the Patent Office by Dr. F. J. Kron, of Albemarle, Stanly county, North Carolina, and described by him as exceedingly destructive to all grape-vines except the Scuppernong. It destroys the plants by eating the crown of the roots in the same manner as its congener the peach-worm, or borer, *(Ægeria exitiosa,)* injures peach trees. Dr. Kron states "that they are found about the vines and on the wing from the middle of June to the middle of September, during which time they couple and lay their eggs. These insects are of a dark-brown color, more or less tinged with a tawny orange on the side, and banded with bright yellow upon the edge of the second ring of the hind body. The thorax and shoulder-covers, and the fourth ring are more faintly edged with yellow or with tawny orange. The feelers, antennæ beneath, and legs are also orange colored. The fore-wings are dusky, the hind-wings tranparent, but veined and edged with black. The female has a little orange-colored tuft on each side of the tail, and the males have two tufts on each side—the middle pair longer than the others. The males are more numerous, more active, and smaller than the females. They measure from five to six-tenths of an inch in length, and their wings expand from an inch to an inch and three-twentieths. The body of the female varies from six to nine-tenths of an inch in length, and her wings expand from an inch to an inch and a half. These insects lay their eggs near the roots of vines, and the whitish grubs hatched therefrom, of various sizes, will be found boring into the bark and wood during the summer. When fully grown, the grubs measure from an inch to an inch and three-quarters in length. They undergo their transformations in oblong-oval pods formed of a gummy kind of silk, covered with fragments of wood, bark, and dirt, which will be found within or adjacent to the injured roots. The insects take the chrysalis form at various times during the summer. The wings of the chrysalis are surrounded with minute

teeth which assist the insect in coming forth from the cocoon, when about to be changed into a moth."

As this insect is only lately described to be injurious to grape-vines, the remedy is not yet known, but it might be well to try the plan recommended by Dr. Harris for the peach-tree borer, (*Ægeria exitiosa,*) and to be found in the remarks on that insect. Dr. Kron recommends all other grapes to be grafted on the Scuppernong where the climate will admit, as that variety has not yet been attacked by the borer.

THE PLUM WEEVIL.

The plum weevil, or curculio, (*Rhynchænus nenuphar,*) plate 7, is one of the most destructive insects that the horticulturist has to fear, not to plums alone, but to cherries, nectarines, and apples, which are indiscriminately attacked; and in the more southern States peaches also suffer much from the larvæ of a weevil of this kind, of similar habits and shape, if not identically the same. The perfect curculio is about two-tenths of an inch in length, of a dark-brown color, with a spot of yellowish white on the hind part of each wing-case. The head is furnished with a long curved snout, or bill, with which it is enabled to bore into the unripe fruit by means of jaws placed at the end of this bill. The wing-cases, which are ridged, uneven, and humped, cover two transparent wings, by which the perfect weevil is enabled to fly from tree to tree; but when these wing-cases are closed, the back appears without any suture, or division, which has led to the very erroneous idea among farmers that the insect cannot fly. When disturbed, or shaken from the tree, it is so similar in appearance to a dried bud that it can scarcely be distinguished, especially when feigning death, which it always does when alarmed. As soon as the plums are of the size of peas, the weevil commences the work of destruction by making a semi-circular cut through the skin with her long curved snout, in the apex of which cut she deposits a single egg. She then goes to another plum, which is treated in a similar manner until she has exhausted her whole stock of eggs. The grubs, which are hatched by the heat of the sun, immediately eat their way to the stone in an oblique direction, where they remain gnawing the interior until the fruit is weakened and diseased, and by this treatment falls from the tree. The grub, which is a small, yellowish, footless, white maggot, then leaves the fallen fruit, enters the earth, changes into a pupa, and in the first brood comes to the surface again, in about three weeks, as a perfect weevil, to propagate its species and destroy more fruit. It has not yet been decided whether the latest generation of the weevil remains in the ground all winter in the grub or in the pupa state. Dr. E. Sanborn, of Andover, Massachusetts, asserts, however, that the grubs, after having entered the earth, return to the surface in about six weeks as perfect weevils, which must remain hidden in crevices until spring. The most popular opinion is that they remain in the larva or pupa state in the earth during the winter, and only reappear in the spring in a perfect state. The worm, or grub, is often found in the knots or excrescences which disfigure and destroy plum trees, and has been wrongfully accused of being the

cause of these swellings; but it is highly probable that the weevil, finding in the young knots an acid somewhat similar to that of the unripe fruit, merely deposits its eggs therein, as the nearest substitute for the real plum.

Some of the remedies recommended for preventing the ravages of these insects are actually absurd, such as tying cotton round the trees in order to prevent them from ascending, when it is known that they are furnished with wings and fly from tree to tree with the greatest ease. Among the remedies at present in use one is to cover the fruit with a coating of whitewash mixed with a little glue, applied by means of a syringe; another is to spread a sheet upon the ground under the tree and then jar the principal branches suddenly with a mallet covered with cloth, so as not to bruise the bark, when the perfect insects will fall into the sheet and feign death, and may be gathered and destroyed. Hogs are sometimes turned into plum orchards where, by eating the fallen and diseased fruit, they materially lessen the evil. Coops of chickens placed under the trees, and the branches often shaken, the insects fall, and are eagerly seized and devoured, have also been recommended. All fallen fruit should be gathered up several times in the course of the season and burnt or given to hogs, or destroyed in some other way. By so doing, thousands of the grubs which have not yet left the plums are effectually destroyed; but as yet, no thoroughly practical remedy has been made public, and the above are merely mentioned as being useful in small gardens containing only a few trees.

THE APPLE OR CODLIN MOTH.

The apple moth, (*Carpocapsa pomonella*,) plate 7, may be seen, during the latter part of June and the beginning of July, flying about our orchards in the evening, busily depositing her eggs near the crown, or the calyx, of the fruit. These eggs hatch in a few days, and the young worms immediately eat a passage towards the core, where they remain burrowing and eating until ready to change into the chrysalis state. The constant injuries received by the gnawing of the worm generally causes the apples to ripen prematurely and fall to the ground. The caterpillars are of a red or flesh color, when fully grown, and leave the apple through a small hole previously made, and through which the refuse of their food has been thrown out. They then creep into crevices in the bark, or any other place of concealment or shelter which they can find, and spin small semi-transparent cocoons of thin silk. In these they change into small chestnut-brown chrysalides, and in a few days the first generation of moths come out. These moths measure about seven-tenths of an inch across the wings when expanded, and are of a brownish-grey color, crossed by numerous darker and lighter colored wavy lines. There is a dark-brown spot of an oval shape near the margin of each upper wing. The under-wings are brownish grey, much lighter than the upper pair, and not watered in a similar manner but shaded darker near the margin.

The remedies which have been recommended are to fold cloths loosely round the forks of the trees, or around their trunks near the ground, so that the worms can retreat into them for shelter, when about

to form cocoons. The chrysalides may then be destroyed before they change into perfect moths. All wind-fallen apples should likewise be given to swine, or otherwise destroyed before the worms escape.

THE PEACH-TREE BORER.

The peach-tree borer, *(Ægeria exitiosa,)* plate 7, is produced from eggs deposited at the foot of the peach tree by a wasp-like moth of a steel-blue color, with an orange ring round the abdomen. The eggs are deposited during the summer upon the trunk close to the ground, and sometimes also in wounds or between the crotches of trees. The worms when hatched devour the inner bark and young wood, generally just beneath the surface of the earth, frequently girdling the tree and destroying its life. Often when the leaves turn yellow or appear sickly, as in the disease called the "yellows," if the ground round the trunk should be turned up, the cause of the disease would be discovered to be this worm, which should be immediately cut out and destroyed. Trees attacked by these insects can be easily recognized by the gum which oozes out of the wounds they have made. There appears to be a succession of broods during the warm season, as very young worms are found at almost all times, except in the colder months; but it has been stated that they must pass a whole winter before they can assume the perfect state. On the Hudson, in New York, the moths come out mostly about June and July, and from the chrysalides taken from a peach orchard I found nearly twice as many males as females. Nectarines and apricots are as liable to be attacked by these worms as the peach. They are also sometimes taken from the plum-tree roots, as well as the knots or excrescences to which the plum is liable, but which are in nowise caused by them. The worm is about an inch in length, of a yellowish white, with an amber-brown head. The chrysalis is brown, and formed in a case of an oval shape, made of the chips gnawed from the bark and a gummy substance which issues from the mouth of the insect. The perfect moth measures about an inch across the expanded wings. The male is smaller than the female, and may easily be recognized by all the wings being transparent, bordered and veined with steel blue, while the upper wings of the female are opaque and of a dark-blue color. The under ones are transparent, veined and bordered with blue as in the male. Her body is likewise distinguished by a broad orange-colored belt.

Dr. Harris, in his valuable "Treatise on the Insects of New England Injurious to Vegetation," recommends the following remedy: "Remove the earth around the base of the tree, crush and destroy the cocoons and borers which may be found in it and under the bark, cover the wounded parts with the common clay composition, and surround the trunk with a strip of sheathing paper eight or nine inches wide, which should extend two inches below the level of the soil, and be secured with strings of matting above. Fresh mortar should then be placed around the root so as to confine the paper, and prevent access beneath it; and the remaining cavity may be filled with new or unexhausted loam. The operation should be performed in the spring or during the month of June. In the winter, the strings may be removed,

and in the following spring the trees should again be examined for any borers that may have escaped search before, and the protecting applications should be renewed." The ashes of anthracite coal have also been recommended to be put into the cavities made when the earth has been removed from around the trunks when searching for the worm; and if the trunks are thoroughly searched three or four times a year, especially in the earth near the roots, and the grubs or chrysalides dug out and destroyed, these insects would soon cease to be as injurious as they are at present.

INSECTS BENEFICIAL TO AGRICULTURE.

All the insects figured on plate 8, especially the first four, may be classed amongst the best friends to the planting interests of the South, as by their united efforts they assist most materially in the work of destroying the cotton louse *(Aphis ?)* During some seasons it would be almost impossible to raise the young and tender plants were it not that Nature had furnished these small and apparently insignificant allies to feed upon and destroy millions of these pests, the natural fecundity of which is so great that we could never destroy them were it not for their aid.

THE ICHNEUMON FLY.

The ichneumon fly, *(Ichneumon?)* plate 8, which destroys the aphis, is a very small blackish insect, with yellowish legs and abdomen, not quite the twentieth of an inch in length, and yet it destroys myriads, unobserved and unseen, constantly preying upon the vitals of the aphis. The female fly lays a single egg in the body of each louse, which, when hatched, becomes a grub.

This grub devours the interior substance of the aphis, leaving only the grey and bloated skin clinging to the leaf, which serves the young insect as a shelter, where it remains in the larva and pupa state, until it changes into the perfect fly, which emerges through a hole gnawed through the back of the skin, and issues forth furnished with four transparent wings to recommence the beneficial labor of depositing more eggs in the surrounding colonies of lice on the neighboring plants. The numbers of the lice destroyed by this insect can be more fully appreciated merely by observing the empty grey skins, each with a hole in its back, more or less scattered over the plants infested by the aphis, and which have been destroyed by the ichneumon fly.

THE SYRPHUS.

The larvæ of the Syrphus, plate 8, are found wherever aphides, or plant lice, abound, and present the appearance of small yellowish-white naked grubs, or maggots, of about two-tenths of an inch in length. The head part of these grubs gradually tapers to a point, whilst the

tail terminates abruptly as if cut off. Some species, however, have this part furnished with two or more protuberances or sharp points. The parent fly deposits her eggs singly, amongst the lice, in order to insure an adequate supply of food to each grub. These eggs are soon hatched by the heat of the sun, and the young grub immediately commences crawling about the leaf, and being blind, incessantly gropes and feels around on either side in search of its natural food, the plant or cotton lice, one of which being found by the touch is instantly seized by the grub, and elevated high above the surface of the leaf on which it is quietly feeding, in order to prevent the struggling victim from using its feet or clinging to the leaf when endeavoring to escape from its ruthless and voracious destroyer. After piercing the living insect, the grub leisurely sucks out the juices, throws away the empty skin, and recommences feeling about in search of another victim, which is immediately treated in the same way. When ready to change, the syrphus maggot fastens itself to a leaf or stalk by means of a glutinous secretion from its own body, and the outer skin, contracting into a pear-shaped case, soon hardens by exposure to the air, and the pupa is formed inside. After a few days, during the heat of summer, the perfect fly emerges from a hole at the blunt end of the case to lay eggs amongst the colonies of lice on the neighboring plants. The perfect fly is about seven-tenths of an inch across the wings, which are two in number, and transparent. The body is generally more or less banded with brown, or black and yellow, and appears like a diminutive wasp. This fly has a peculiar habit of hovering on the wing, apparently without motion or exertion, during the heat of the day, near or over flowers, and when disturbed it darts away with great swiftness; but if the object that alarms it is removed, immediately resumes the same attitude and spot, only darting off every now and then to chase some other intruding fly from its own peculiar domain, over which it appears to imagine it possesses absolute sway.

These insects are of essential aid to the farmers and planters, as their larvæ materially diminish the numbers of lice which infest vegetation.

THE LADY-BIRD.

The lady-bird, (*Coccinella?*) plate 8, here figured, is a most valuable auxiliary to the cotton planter, as it destroys the cotton louse, or aphis, by thousands, and is most plentiful where the lice abound, always busy at the work of destroying them; and, as such, I consider it one of the most beneficial insects to the planter. The larva is a small bluish-black alligator-looking insect, of about the fourth of an inch in length, spotted with a few orange marks on the back and sides. Whenever one of these is seen among a colony of aphides, the planter may safely calculate that in a few days their numbers will be greatly decreased. The larva, when hungry, seizes an aphis, and immediately commences eating him alive. This savory repast being finished, it eagerly hunts about until it has secured another victim, and has completely destroyed all others upon the leaf. When about to change into the pupa, it fastens itself by the tail to a leaf, the skin of the back splitting open, a

small, hump-backed, black and orange-colored pupa makes its appearance, which, although furnished with the rudiments of wings and legs, is incapable of locomotion or feeding, but remains adhering to the leaf, with the dried-up skin of the larva still sticking to the end of the pupa. After remaining in this state for a few days, this skin again splits, and the perfect lady-bird emerges, furnished at first with soft wings, but which afterwards harden, and serve to transport it to the distant colonies of cotton lice, in the midst of which the eggs are again deposited, to form new broods for the destruction of the planter's greatest pest. The perfect lady-bird also devours aphides, but not in such numbers as the larvæ, in which state it also destroys the chrysalis of the butterfly, (*Argynnis columbina*,) seen so often in the cotton fields. I have repeatedly seen them in Georgia killing the chrysalides of this butterfly, which hung suspended from the fence rails, and on the under sides of the boughs of shrubs and trees. It appears to attack the chrysalis chiefly when soft, and just emerged from the caterpillar skin. It is in this state that these wandering larvæ attack it, and, biting a hole in the skin, feed greedily upon the green juice which exudes from the wound. It sometimes, however, becomes a victim to its own rapacity, for the juice of the chrysalis, drying up by the heat of the sun, quickly forms an adhesive substance, in which the larva is caught, and detained until it perishes. Indeed, so very voracious are these larvæ that they will even devour the defenceless pupæ of their own species when found adhering to fences or walls.

Many planters imagine that these lady-birds are in some mysterious manner connected with the appearance of the cotton louse, or even that they are the progenitors of the aphis itself. This erroneous impression is in consequence of these insects being always found in similar situations at the same time, and abounding on plants already weakened by the attacks of the cotton louse. Their sudden disappearance is also accounted for, as, with the decrease of their natural food, the lady-birds also disappear, and migrate to neighboring plantations in search of a fresh supply of nutriment. I have actually known several planters who have caused them to be destroyed by their field hands, when and wherever found, and who complained that their plants were still destroyed by the aphis, or cotton louse. This was only to be expected, as they had destroyed the natural enemy of the louse, and suffered the pests themselves to breed in peace and safety. I have seen the larvæ of the lady-bird as late as the 18th of November, in Georgia, still busy exterminating the aphis. The yellow oleagineous fluid which is emitted by this insect, when handled, has a powerful and disagreeable odor, and is mentioned by Westwood, in his "Modern Classification of Insects," as having been recommended as a specific for the toothache.

THE LACE-WING FLY.

The larva of the lace-wing fly, *(Hemerobius?)* plate 8, is furnished with two long and sharp jaws, by means of which it seizes the cotton louse, and in a few minutes sucks out the juices, leaving merely the white dried skins to show where they once commit their ravages. The eggs are very singularly placed at the end of a thread-like fila-

ment, fastened to under the side of the leaf, and are generally deposited near a colony of lice, in clusters of a dozen or more together, causing them to appear to the casual observer like a bunch of parasitic fungus. The eggs being hatched in the midst of the cotton lice, the young larvæ commence their work of exterminating the aphis immediately; seizing the younger in their powerful jaws, they hold them aloft in the air, and, in despite of the struggles of their victims, suck out the juices, and finally throw away the empty skins.

The larvæ of this insect are not quite two-tenths of an inch in length, and are furnished with a sort of apparatus at the extremity of their tails by means of which they are capable of adhering to a leaf even when all their feet are detached, thus being guarded against accidental fall during high winds, that might otherwise destroy them. When ready to change, a thread is spun from the tail, and, after forming a rough sort of web, it spins a semi-transparent oval cocoon, from which it emerges as a beautiful bright-green fly, with two brilliant eyes, which sparkle like gold, and four transparent wings, of a greenish cast, delicately veined and netted with nerves, resembling the most beautiful lace work; and hence the common name. This splendid insect, however, emits a most nauseous and fetid odor when held in the hand.

THE CAROLINA TIGER BEETLE.

The Carolina tiger beetle, (*Megacephela carolina*,) plate 8, belongs to the family of the cicindelidæ, otherwise called tiger beetles, from their savage propensities, and the beautiful spots and stripes with which their metallic wing-cases are adorned. These beetles are always hunting about the ground in search of insect food. A smaller and darker species especially delights in the glare and heat of the summer's sun, and when disturbed flies only a short distance, alighting with the head towards the object which has excited its alarm by suspicious movements.

The Carolina tiger beetle is about seven-tenths of an inch in length, of a most beautiful metallic blue, violet, and green, and when placed in certain positions assumes the lustre of gold or bronze. It may also be known by a yellowish curved spot on the extremity of each wing-case. It appears not to be so partial to the light of the sun as the other species, but often hides itself under stones. It is also seen much more frequently in the cotton-fields during cloudy weather, or towards evening, than in a fervid mid-day sun.

THE HARPALUS.

A beetle belonging to the genus Harpalus? (plate 8,) is very beneficial to the agriculturist, inasmuch as its food consists principally of other insects, and of dead putrescent substances. Numbers of them I found running about the surface of the ground in search of food, but when disturbed hid themselves under grass, roots, or stones. The formation of their jaws is peculiarly adapted to a predatory life. As they are very strong, and hooked at the extremity, they are enabled to seize and hold fast any soft-bodied insects which may happen to fall in their way.

THE REAR-HORSE.

The rear-horse, (*Mantis*?) plate 8, is very abundant in the vicinity of Washington, and destroys innumerable insects, which it catches between the sharp spines of its fore-legs, and, by suddenly closing the joint of the leg, impales them, and then devours them alive when struggling to escape. Its voracity is such that the females, which measure sometimes two inches and a half in length, and are larger and stronger than the males, devour their mates when they happen to fall in their way in an unpropitious time. She lays a mass of eggs on the branches of trees, or under the palings of the tree-boxes, which presents the appearance of a brown lump, ribbed or furrowed down the sides. It is rough on the top, and when placed on a bough is easily mistaken for an excrescence or knot. The eggs, however, are subject to be destroyed by a minute ichneumon fly, which deposits its own eggs in those of the mantis. The young are hatched in June, and appear like the perfect insect in shape, except being wingless, and are destructive to the other insect tribes, as I have seen them devouring the aphis with great relish when not more than three days old. It is only in the last stage that they acquire perfect wings, and are able to fly from tree to tree in search of other insects. When at rest, the perfect insect stands on its four hindmost legs, keeping its thorax elevated, with the fore-feet closed, and continually moving the head slowly in a whimsical manner, when watching the motions of any person who happens to disturb its repose. The gait, in general, is a leisurely walk, but when disturbed it can jump with considerable agility.

The rear-horse may be made tame and familiar with mankind, as I knew a lady who had one of them in her room, that, in a short time, became so bold as to come to her when she approached, in order to be fed with flies or small pieces of raw meat, which it readily took from her hand. All the spines of the fore-feet are immovable except the middle one of the second joint, which is also longer than the rest. There are said to be two varieties of moths, grey and green, but I have observed all gradations of color, from brownish grey to light green. Dr. Zimmerman, of Columbia, South Carolina, thinks that they may be distinct species. As destroyers of other insects, and perfectly harmless, the mantis ought to be preserved; although some of the "walking-sticks," or spectres, which belong to the same tribe, are said to devour the young buds of trees, and a farmer, from Reading, Pennsylvania, states that he has seen a wood entirely defoliated by the attacks of a species of spectre, which swarmed to such a degree that the trees were full of them.

THE REDUVIUS NOVENARIUS.

The insect (*Reduvius novenarius*) denoted in plate 8 abounds in the neighborhood of Washington city during the summer and autumnal months, and is very useful in destroying the disgusting caterpillars which swarm on the shade trees. The eggs are deposited in autumn upon branches, and are hatched in May or June. When young, the insects have abdomens of a bright-red color, with some dark or black spots on their backs. The head and thorax are black. When they

shed their first skin they appear of a greyish color, and display only the rudiments of wings. It is only in the last stage that they acquire perfect wings, and are capable of flying with great vigor.

The reduvius measures an inch and a quarter in length, and destroys multitudes of noxious insects in all their states of transformation, and as such is highly beneficial; but, at the same time, it is dangerous to man if handled incautiously, as the punctures made by its piercer are often followed by severe consequences. When about to attack another insect, it advances towards its prey in a most cautious and stealthy gait, apparently lifting up and putting down its feet in the same careful manner as a pointer when approaching his game. When near enough to make the fatal dart, it plunges its piercer into the unfortunate caterpillar, and deliberately sucks out its juices. A small specimen experimented with was placed in a box with ten caterpillars, all of which it destroyed in the space of five hours.

THE ICHNEUMON FLY.

The ichneumon fly, plate 8, I found in the cotton fields near Columbus, busily employed in search of some caterpillar, in the body of which she designed to deposit her eggs, as is the habit of this class of flies in general. The eggs being hatched in the body of a caterpillar, the larvæ devour the fatty substance, carefully avoiding all the vital parts, until they are fully grown, when, having destroyed the caterpillar, or chrysalis, they change into pupæ, and eventually appear as perfect ichneumon flies, again to deposit eggs in other caterpillars. These insects are generally seen running about plants infested with caterpillars, continually jerking their wings and searching anxiously in every cranny and crevice in quest of a caterpillar or grub to form the nest and food for their young; and it is owing to this circumstance that mistakes are so constantly made by novices in natural history. For, when a caterpillar is confined in a glass, there changing into a crysalis, and eventually this fly appears, a young naturalist of course concludes that the fly is produced by the caterpillar; whereas, the rightful tenant of the chrysalis case had previously been displaced and devoured by the larva of this ichneumon fly, which had been hatched from an egg placed by the parent fly in the caterpillar. This fact is merely mentioned here, as in some drawings of insects injurious to the cotton, sent to the Patent Office, the ichneumon fly was figured as proceeding from the chrysalis of the caterpillar, no doubt correctly, but not considered as the parasite which had devoured the chrysalis, but as the perfect insect, and, as such, very injurious.

BEES.

CONDENSED CORRESPONDENCE.

Statement of RALEIGH W. DYER, *of Prillaman's, Franklin county, Virginia.*

Bees-wax is a profitable product in this vicinity, every housekeeper producing it in larger or smaller quantities. The cost of production is about 10 cents a pound. It sells readily in market for 22½ cents, and at times for 25 cents per pound.

SILK.

CONDENSED CORRESPONDENCE.

Statement of RALEIGH W. DYER, *of Prillaman's, Franklin county, Virginia.*

Silk is raised here only by a few persons, and this on a small scale. But I am satisfied, from experiments I have witnessed, that it could be made a profitable business. The Morus multicaulis is, I suppose, as thrifty here as anywhere else in the world.

FERTILIZERS.

GUANO.

ITS HISTORY, SOURCES, QUALITIES, AND APPLICATION.

Guano, or *huanu*, which signifies in the Peruvian or Quichua language, "manure," is now well known to be the excrements of various species of sea-fowls, such as terns, cranes, pelicans, flamingos, men-of-war birds, gannets, mews, divers, &c., and sometimes of turtles and seals, the former of which resort, in immense numbers, to small uninhabited islands or rocky promontories on the coasts of Africa and South America, as well as in other parts of the globe, where they have remained in undisturbed possession for ages, and on which their dung and exuvæ have gradually accumulated, in some instances, on the coast of Peru, according to Humboldt, to a depth of 50 or 60 feet; but their deposites for a period of 300 years had not formed a bed more than from one-third to one-half of an inch thick.

As regards the history of this substance, we read in all the works relating to the ancient agriculture of the Peruvians of its value as a fertilizer, and admire the provident use made of it by the Incas, long before that patriarchal race of monarchs had been exterminated by their chivalrous invaders, the Spaniards. For more than a century, the early navigators to the Pacific had noticed the guano islands, and had seen cargoes of this deposit conveyed to the adjacent mainland, where they must have witnessed the greater luxuriance of the herbage, as well as the increased weight of the crops wherever it was applied. European and American merchants, also, who have had opportunities ever since the declaration of Peruvian independence, of forming establishments of their own on the coast, as well as in the interior, could not have been ignorant of the use made of guano by the natives, and the astonishing effects it produced on their crops. The delay, therefore, of introducing it into Europe and elsewhere could not have occurred through the want of a knowledge of its value, nor of its applicability to a foreign soil.

It was not until the year 1806 that the true nature of this substance, as a fertilizer, was communicated to the scientific world, when a sample was transmitted by Humboldt, on his return from South America, to Messrs. Fourcroy and Vauquelin, of Paris, two eminent chemists, who made a most careful and elaborate analysis of it, the results of which are published in vol. lvi. of the "Annales de Chimie." They found it to contain one-fourth of its weight of uric acid, partially saturated with ammonia, and small quantities of sulphate and muriate of potash, mixed with portions of quartzose and ferruginous sand. From this circumstance, a knowledge of its value was communicated to most of the enlightened agriculturists of Europe as well as of the United States, but no application was made of it in either country before the year 1824, when the late Mr. Skinner, then editor of the "American Farmer," received two barrels of it at Baltimore, and distributed, in small parcels, for experiment. Governor Lloyd, of Maryland, an intelligent and enterprising farmer, to whom a portion was sent, pronounced it "the most powerful manure he had ever seen applied to Indian corn." It was first recommended to notice, as a fertilizer, in England, by Sir Joseph Banks, at whose suggestion General Beatson made an elaborate series of experiments in 1810, with potatoes, in connexion with other manures, at the island of St. Helena, which were exceedingly interesting, not only from their novelty at that time, but for the comparatively useful results.

But no further measures were taken to introduce this manure, with the exception of a few samples sent home by travellers in Peru, with which experiments were made in Europe and in this country, more as a matter of curiosity than from any other expectation, until the year 1840, when twenty barrels arrived in England to test its qualities upon the soil. At first, it was used with great precaution; and notwithstanding the astonishing results of the earlier experiments, the fear that the enormous crops which it produced might exhaust the land, deterred the British farmers, generally, from availing themselves of so valuable a manure. Repeated experiments, however, having convinced them that it imparts great vigor to the plants without injury to the soil, where due regard is paid to the supply of vegetable matter, and that it is the

cheapest as well as the most nourishing fertilizer known; the increase of its consumption was such, that, from a few tons employed in 1840, the whole amount imported into the united kingdom of Great Britain, up to the beginning of the year 1855, was 1,564,915 tons.

The imports into Great Britain, as far as known, since the commencement of the trade, were as follows:

	Tons.
1841	2,881
1842	20,398
1843	3,002
1844	104,251
1845	283,300
1846	89,220
1847	82,392
1848	71,415
1849	83,438
1850	116,926
1851	243,014
1852	129,889
1853	123,166
1854 (11 months)	201,623

The countries from which it was imported, and the quantities brought from each during the year 1852, are as denoted below:

	Tons.
Africa, east coast of	1,363
Africa, South	7,273
Africa, west coast of	4,192
Ascension	705
Australia	727
Bolivia	6,213
Brazil	650
Buenos Ayres	932
Chili	11,191
China	790
Patagonia	7,282
Peru	86,293
Uruguay, Oriental Republic of	1,575
Eight other places	703
Total	129,889

Imports of guano into the United States, according to the Treasury reports, during the last seven years, ending June 30, 1854, *were as follows :*

Names of countries from which imported.	1847–8.	1848–9.	1849–50.	1850–1.	1851–2.	1852–3.	1853–4.
	Tons.	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*
Africa	....	....	....	....	....	148	....
America, Central	....	....	....	300	50	....	....
America, South, generally	....	1,870	5,850	2,100	4,281	1,530	....
Argentine Republic	....	190	....	....	220	....	60
Brazil	....	320	....	....	1,928	708	798
British American Colonies	45	1	....	....	577	6,876	....
British West Indies	40	743	140	8	1	1	250
Cape of Good Hope	....	16	....	....	....	....	502
Cisplatine Republic	....	....	....	40	1,345	....	....
Chili	25	....	....	9	1,710	2,134	....
Danish West Indies	....	85	....	....	....	....	250
England	34	143	....	2	25	....	....
France on the Atlantic	....	128	....	....	....	....	....
French West Indies	....	400	....	....	....	....	....
Mexico	....	....	....	....	350	....	5,590
New Granada	....	....	....	85	....	200	4,487
Oriental Republic of Uruguay	....	....	....	....	....	320	....
Peru	869	17,347	5,750	20,059	39,567	25,852	163,662
Sandwich Islands	....	....	....	....	....	265	....
South Seas and Pacific	....	....	....	550	....	....	....
Spain on the Atlantic	....	....	....	....	....	....	250
Total	1,013	21,243	11,740	23,153	50,054	38,034	175,849

From the great consumption of guano in England, and the success with which it was everywhere attended, its introduction became gradual into the United States; and, for several years past, the demands for a genuine article have been so great by the farmers along the Atlantic coast that their wants could not be supplied.

Independently of the immense quantities imported from Mexico, Bolivia, and Peru, guano has been obtained from Ichaboe, a rocky islet on the coast of Africa, from which many thousand tons were shipped; and it has been scraped down to the very rock itself, by the emissaries of the greedy agriculturist, and again abandoned to solitude. Considerable quantities have also been brought from Patagonia, Chili, and the islands of the South Sea; but, as might have been expected from the nature of the climates from which they were obtained, they were either found to be worthless or far inferior in quality to those of Bolivia and Peru.

From this great and insatiable demand for guano in England and elsewhere, the most wilful adulterations have been made in that country, confined, principally, to the Peruvian, by mixing with it gypsum or sand, or, more correctly speaking, with a sort of brownish-yellow loam, not differing much from the color of guano itself; but as ready means have recently been discovered for detecting these frauds, together with severe enactments for punishing the perpetrators, the practice, it is hoped, will soon become obsolete.

Guano, like all kinds of animal excrements, varies materially in its

quality, according to the nature of the food habitually used. The richer and more nutritious it is, the greater will be the fertilizing properties of the manure. Hence the dung of the highly fed race-horse is more valuable than that of the drudge released from the cart and kept upon low fare. For the very same reason the excrementitious deposits of birds feeding upon fish or flesh afford a stronger manure than parrots or pigeons, which live on berries and grain. Again, guano is very materially influenced by the age and climate in which it is found. Thus, during the first year of its deposit, in Bolivia or Peru, the stratum is whitish and abounds in uric acid; but in the lower strata, which have existed, perhaps, for ages, the color is a rusty red, as if tinged with oxide of iron. They become progressively more and more solid, from the surface downward—a circumstance naturally accounted for by the gradual accumulation of the strata, and the evaporation of the volatile parts. In all climates subject to rains and heavy dews the guano exposed to their influence undergoes fermentation, loses a portion of its ammonical salts by the decomposition, and thereby is diminished in value. The excrement of the birds, when first deposited, is rich in nitrogenous compounds. No ammonia, as such, exists among its constituents; but the access of air and moisture induce a slow decomposition by which ammonia is generated, and when the circumstances are favorable it escapes into the atmosphere. Wherever moisture is abundant these changes are most rapidly effected; whereas, on the other hand, a dry climate and a rapid accumulation of the deposit are more likely to insure its preservation in a comparatively unchanged state.

From the preceeding remarks, it is obvious that the composition and consequently the value of the different kinds of guano will vary according to the age and localities from which they are obtained. The varieties principally known to commerce and agriculture are as follows:

Anagamos Guano.—By a subsequent table, it will be seen that this guano contains a larger per-centage of ammonia, with a due share of phosphates, than any other kind in the list. It is a perfectly recent deposit, collected by hand from the rocks, which accounts for its richness. Although it is not distinctly known whether the composition of the dung of birds, recently voided, is perfectly alike, we have reason to suppose that of sea-fowls, all piscivorous and nearly allied in their habits, cannot greatly differ. From this circumstance, it is worthy of investigation to ascertain whether the *Florida guano*, deposited on the Keys by immense flocks of flamingos, pelicans, and other aquatic birds, cannot be collected after the manner of that from Anagamos, and turned to profitable account.

Bolivian Guano.—Next in value as a fertiliser to the Peruvian guano, hereafter mentioned, stands the Bolivian, which, from the similarity of the climate in which it is produced, being obtained only a few degrees further south, it has been placed in the very first rank of excellence. Some cargoes, however, have proved to be of very inferior quality, obviously having been adulterated, or had been subject to moisture or long exposure to the wind and sun.

Chilian Guano.—Of this fertilizer, two qualities have been imported.

The one most commonly met with is of a quite inferior description, and scarcely deserves the name of guano; but there is another and a very valuable variety, although rare, which is imported from Valparaiso, and is stated to be collected on the rocks. It is quite hard, and comes in large pale-yellowish masses; and, in value, it is said to be equal to that of the best Peruvian.

Columbian or Bird Island Guano.—A guano has recently been imported from Bird Island, situated some 400 miles off the coast of Venezuela, 200 miles south of St. Thomas, and 150 miles westward of Guadaloupe. From careful analyses, it has been ascertained that this substance is by far the richest source of phosphoric acid for the farmer yet discovered, as it contains 84 per cent. of dry super-phosphate of lime, or about one-third more than pure ground bones. It also contains less than one-fourth the quantity of water, always present in the Peruvian article, and from 20 to 30 per cent. less than any other guano known. One hundred parts of the Bird Island article contain the phosphoric acid necessary to form $95\frac{2}{5}$ parts of bone phosphate of lime. Of dry organic matter and ammonia, it contains $6\frac{1}{5}$ per cent.

Galápagos Guano.—It appears that, recently, considerable deposites of guano, of an excellent quality, have been brought under public notice at the Galápagos, a group of islands in the Pacific ocean, lying directly under the equator, some 600 miles west of Ecuador, in South America. In this group, there are four main islands, besides numerous islets, the shores of which abound in tortoises, and are frequented, also, by myriads of aquatic birds. From the latter, the guano of these islands is chiefly derived. A sample lately, said to have been submitted by the Department of State to Professor E. N. Horsford, of Harvard University, for analysis, is described as a chocolate-colored or brownish-yellow powder, containing occasional dull-white lumps, and exhaling a strong ammoniacal odor. The sample contained 15 $\frac{59}{100}$ per cent. of ammonia, which places it on a par with the best average of Peruvian guano, and greatly superior to many other varieties in market.

Ichaboe Guano.—This guano, although abundant a few years since, has now almost entirely ceased in its supply. It is designated under the names of the "old" and the "new Ichaboe," the former being a deposit probably many centuries of age, which had been exposed to the sun, wind, and rain, and, consequently had lost a large share of its virtue, and hence inferior in value. Soon after its discovery the whole of the deposit with which the island was covered was entirely removed. So completely, indeed, was this done, that the last cargoes carried away were little better than sand, and the island was again abandoned to the birds. Since that time, the sea-fowls returned, rapidly formed fresh deposites, and other importations have been made, designated under the name of the "new Ichaboe," which proved on analysis to be much richer than the "old." It appears that the recent Ichaboe guano contains an amount of ammonia not far short of double of that contained in the older deposit, and between three and four per cent. more than the highest per-centage hitherto observed. It approaches in composition much nearer that of Peru, both in this respect and in the small amount of phosphates and larger quantity of alkaline salts which it contains. In one other respect, also, it is remarkable, and this is in the

considerable per-centage of carbonate of lime, of which traces only are found in the oldest deposits, and none at all in the Peruvian.

Mexican Guano.—Within a year or two past, several varieties of guano have been imported into England and the United States from the coasts of Mexico and the islands adjacent. The quality of that existing on the Atlantic side is stated to be entirely distinct from the Peruvian descriptions, its richness, in some instances, consisting in 60 per cent. of phosphate of lime. That which exists on the islands and headlands of the Pacific coast and in the Gulf of California is described as being of a more varied character. In some parts, where the climate is nearly rainless, the guano will doubtless prove of great value, while in other places, and where frequent and copious rains occur, it may be expected of little or no worth except in the amount of phosphates it may contain. Thus far, there seems to be no accurate classification of the respective sorts, nor any reliable information as to the quantities which may be obtained.

The islands containing the greatest amount of guano on the Atlantic side are what are called the Triangles, near the coast of Yucatan. On the Pacific side, it particularly abounds on three islands, known under the name of the Marias.

Patagonian Guano.—This variety, from the high latitude in which it is produced, and subject as it is to frequent rains, alternated by intense sunshine and drying winds, has usually been purchased at higher prices than its quality justifies. Its inferiority to Peruvian or Bolivian guanos is very marked, especially in its amount of ammonia; and from numerous analyses, it has been ascertained that it contains a considerable quantity of sand, in one case at least 38 per cent. This guano, it is believed, never is wilfully adulterated. In fact, its quality is so low that it will not bear it. There is said to occur among this guano considerable quantities of crystals, composed almost entirely of the salt called "ammoniaco-magnesian phosphate," which, when pure, contains no less than 7 per cent. of ammonia. These crystals, it has been stated, have been carefully avoided by the captains of vessels, with the impression that they were of no value.

Peruvian Guano.—From the large amount of ammonia and phosphates contained in this kind of guano, together with the almost inexhaustible supply, and the circumstances attending its origin, collection, and importation, the farmer can more implicitly rely upon it for fertilizing his fields than any other. Being the production of a climate where rain seldom or never falls, its composition becomes less altered, and its character less varied, except in color, than those varieties found further north or south.

During the first year of deposit, the stratum is of a whitish color, when it is called by the natives "guano blanco." In the opinion of the Peruvian cultivators this is the most efficacious kind, as less quantity suffices, and the field must be more speedily and abundantly watered after it is applied; otherwise the roots of the plants would be destroyed.

In the deepest deposites the uppermost strata are whitish, or of a greyish brown, which gradually become darker as they are opened downward. In the lower strata, the color is rusty red, as if tinged with the oxide of iron. The beds become progressively more and more

solid from the surface downwards, a circumstance naturally accounted for by the gradual deposit of the strata and the evaporation of the fluid particles, the result, perhaps, of an uninterrupted accumulation during many thousand years.

As before remarked, the wilful adulteration of guano is believed to be confined almost entirely to the Peruvian; hence much precaution is necessary on the part of the farmer in making his purchases, otherwise he is liable to be deceived. It is not enough to know that the "substance is of a brown color, sufficiently dry, with a tolerably strong smell, and appearing to contain little or no gritty matter when rubbed between the fingers;" for, if genuine, all guanos have a general character running through them. For instance, they invariably contain feathers and comminuted shells; water, of course; organic matter, always; crystalized gypsum, never; carbonate of lime, commonly; phosphate of lime, always; super-phosphate, never; and nitrogen, or ammonia, invariably. Several of these points can only be determined by accurate analysis, which farmers in general are incapable of doing. All the risk and uncertainty, therefore, to which the farming public is now subjected, might be avoided if they would give up seeking for *cheap* guano, buy from dealers of known character and honesty, and insist that the purchase shall be guaranteed to be of the same composition as a sample analyzed by some chemist of well-known accuracy and veracity.

In selecting samples for analysis, they should always be taken from as many bags as possible. A large handful or two should be selected from perhaps a dozen different bags, and the whole laid on a large sheet of paper, and mixed carefully together with the hand. From this, about a pound should be taken, and the remainder returned into the stock. This precaution is desirable in all sorts of guano, but is quite indispensable with the inferior kinds, which frequently differ very much in different parts of the same cargo.

Saldanha Bay Guano.—This variety, like the Patagonian, comes from a latitude and climate subject to heavy rains, alternated by an intense sun, and consequently loses the greatest part of its ammonia, unless it is collected in a very recent state. Its chief value as a fertilizer consists in its phosphates, which range higher than those in any other variety hitherto known, except the Mexican and Columbian.

The foregoing includes most of the varieties of guano that have appeared in any quantity in the European and American markets, the average composition of which is indicated in the adjoining table, by Dr. Thomas Anderson, chemist to the Highland and Agricultural Society of Scotland. In the more common guanos the average is deduced from a large number of analyses, made by himself in his own laboratory, or from those of others in whom he could implicitly rely.

Analyses of Guano, by Dr. Thomas Anderson, chemist to the Highland Agricultural Society of Scotland.

	Anagamos.	Peruvian.	Bolivian.	Chilian, fine.	Chilian, inferior.	Ichaboe, old.	Ichaboe, new.	Patagonian.	Saldanha bay.
Water	13.61	13.73	15.79	6.06	15.09	24.21	18.89	24.36	21.03
Organic matter and ammoniacal salts	57.90	53.16	56.09	54.51	12.88	39.30	32.49	18.86	14.93
Phosphates	19.50	23.48	15.13	11.96	16.44	30.00	19.63	41.37	56.40
Lime	.....	.....	0.15	1.37	8.93	.....	2.49	2.94	.....
Sulphuric acid	.....	.....	.....	.....	.....	.....	.....	2.21	.....
Alkaline salts	6.97	7.97	6.81	10.25	6.04	4.19	6.91	2.70	6.10
Sand	2.02	1.66	6.03	15.85	40.62	2.30	19.59	7.56	1.54
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Ammonia	20.58	17.00	19.71	18.80	2.11	8.50	10.42	2.66	1.62

A moment's inspection of the table will render apparent, much more clearly than words can, the great difference in the composition of the different varieties of guano; and as their values differ quite as much as their composition, it is of much importance for the farmer to have a ready means of estimating, from the composition, their value.

Now, practically, there are only two constituents which require to be taken into consideration in the estimate of the commercial value of a guano, and these are the *ammonia* and the *phosphates*. With the exception of the alkaline salts, none of the other constituents have much value; and these last, though no doubt worth something, are too small in quantity, and too unimportant, to deserve consideration. In order to estimate the worth of a guano, then, we require to know the value of ammonia and phosphate of lime; in other words, the price at which they can be bought in the market in other forms than that of guano. Professor Way, of the Royal Agricultural Society of England, has gone fully into this question, and has deduced from a variety of considerations, that the value of ammonia is very nearly sixpence sterling per pound, and that of phosphate of lime about three farthings per pound. Suppose, then, we wish to estimate the value of a ton, (2,000 pounds,) of Peruvian guano of the average composition, we calculate from the per-centage the number of pounds of ammonia and phosphates present in it; and calculating 12½ cents for each of the former, and 1½ cents for the latter, we have the value of the ton. Thus:

17 per cent. of ammonia is equal to 340 pounds in a ton of 2,000 pounds, at 12½ cents	$42 50
23.48 per cent. of phosphates is equal to 470 pounds in a ton, at 1½ cents	7 05
Value of a ton of Peruvian guano	49 55

Exactly in the same manner we are enabled to find the value of a ton of Saldanha bay guano:

1.62 per cent. of ammonia is equal to 32.4 pounds in a ton, at 12½ cents	$4 05
56.4 per cent. of phosphates is equal to 1,128 pounds in a ton, at 1½ cents	16 92
Value of a ton of Saldanha bay guano	20 97

Strictly speaking, something should be allowed for the alkaline salts present; but the exact value cannot be estimated without some difficulty. It might average from $4 to $5 per ton, which should be added to the above, thus making Peruvian guano worth about $54 a ton.

Guano, like farmyard manure, it is hardly necessary to state, may be applied with advantage to almost any kind of soil, as well as to most of our cultivated crops, as it contains every element necessary to their growth, independent of the quality of the soil, one great point being attended to, that the land be in *good tilth;* for, otherwise, the

tender roots of the vegetables would meet with obstructions, and become crippled in their growth. Poor, well-tilled soils receive the most advantage from this fertilizer, as they are most generally deficient in some essential necessary to the growth and perfection of the plants. In regard to the amount to be applied to an acre, this will depend upon the variety of guano employed, the nature of the climate and state of fertility of the soil, the kind of crop to be raised, the number of applications in a season, and whether the guano is to be used alone or in conjunction with other manure.

Taking the best Peruvian guano as a standard, in a soil of medium quality in the Northern States, an acre of wheat, barley, hemp, or flax will require about 250 pounds mixed with ten times its bulk of earth, garden mould, well-rotted peat or swamp muck, and sown broadcast, and plowed or harrowed in with the seed just before a rain. If the soil be rather poor, 300 pounds will be necessary; if good, 200 pounds will suffice. For oats, peas, and rye, 200 pounds will be enough. Grass lands of several years' standing may be renovated or greatly improved by sowing about 300 pounds broadcast in wet weather, soon after the young blades begin to shoot. For turnips, potatoes, cabbages, tobacco, and Indian corn, 200 pounds may be applied broadcast to an acre at the time of planting or putting in the seed, in connexion with decomposed peat, swamp or pond muck, vegetable mould, &c., previously thoroughly ploughing the land, and then well harrowing in the guano, and afterwards raising the earth into beds or ridges by means of a plough, at suitable distances apart for the rows or drills of the respective crops. This will diffuse the guano equally through the soil. When the plants are up, or are sufficiently advanced in their growth to be cleansed or earthed up, a second dressing of 100 or 200 pounds of guano may be applied in the same way as above; that is, spreading it uniformly over the surface, taking care not to scatter it on the leaves nor stalks, and then drawing the earth containing it around the plants. It is regarded as better to apply the guano twice than all at one time, and much more advantageous to work it through the soil, than to put it at the bottom of the drills or hills. When employed in the latter manner, it not unfrequently kills the young plants by coming in direct contact with the roots, or overgorging them with nourishment, and leaves those which survive with an insufficient supply in the advanced stages of their growth.

In the Middle and Southern States, where guano is much employed for manuring tobacco, cotton, sugar-cane, and other Southern crops, about the same quantity may be applied as at the North; but experience has taught the planters that, where the subsoil consists of *clay, mould, or loam*, it is preferable to sow the guano broadcast in the early part of the winter, and plough it under at the full depth, and there let it remain and infuse its virtues throughout the soil, or furrow-slices above, until the crops are sown or planted in the spring, when the ground should be reploughed and harrowed at the time of putting in the seed. But let it be remembered that, where the subsoil contains a large share of gravel or sand, it would be a wasteful practice thus to plough under the guano, as the dissolving rains would carry a large share of its fertilizing properties deep into the earth. A second dressing of 100 to

200 pounds of guano to an acre may also be added to cotton, tobacco, sugar-cane, and other hoed crops, at the time of earthing them up, in a similar manner as recommended for corn and potatoes in the Northern States. For wheat, let from 200 to 250 pounds of guano to an acre be scattered broadcast, just before the seed is sown, and ploughed under to a depth of six or eight inches, and there remain undisturbed, bearing in mind this important rule as regards all fertilizers that are soluble by rains or melting snows : *that there be at least ten inches in depth of loam, mould, or clay directly beneath the manure;* otherwise, the most valuable parts may sink deep into the earth, as they are carried downward by the rain, and consequently will be lost.

For grape-vines, the apple, pear, cherry, plum, and other fruit trees, as well as the orange, lemon, and coffee trees, guano stands unrivalled in its effects as a manure. If the trees or shrubs are small, and are ready to transplant, slanting holes may be dug to receive them, of dimensions proportioned to the depth and extent of the roots, leaving at least ten inches of mould at their bottoms before the guano is put in. Then around the edges of the bottom of the holes, that is, near the foot of the slanting sides, scatter from one-fourth to one-half of a pound of guano, which should be covered with a little light earth or mould, in order that none of the guano may touch the roots when the vines or trees are consigned to the ground. Then, into each hole about two quarts of water may be sprinkled, and the further process of transplanting left till the next day. The trees may now be planted in the position they are intended to grow, and the holes filled up with light soil, leaving a slight depression around each, in order to make the most of any rain that soon after may fall. If the trees or vines have long been planted and have attained a considerable size, the ground about their roots may be forked or trenched in the spring, and the guano scattered broadcast over the surface around each tree, and followed immediately by a copious watering by hand or by a drenching rain. By these means a portion of the guano will become dissolved, sink into the soil about the roots, the good effects of which will be apparent in a very few weeks.

Guano may also be employed as a steep for seeds, or applied directly to the plants, in their second leaf, in a diluted and liquid form ; or it may be advantageously composted with an equal weight of common salt or soot, or with ten times its bulk of vegetable mould, rotted peat, swamp or pond muck, or green-sand marl, mixed with a small proportion of gypsum or charcoal dust, but *never with wood ashes, carbonate of soda, potash, magnesia, nor common lime;* for these will liberate the free ammonia, and thus diminish the value and effects of the manure.

It would always be well to mix the guano, before applying it to a dry soil, with charcoal or common salt, on account of the power which they possess of attracting moisture, in dry seasons, from the atmosphere. A mixture of about three parts of salt or charcoal to one part of guano, has been attended with the most important results as regards the increase of crop. The mixing of Peruvian with Mexican guano in the proportion of 250 to 300 pounds of the latter to 100 pounds of the former to an acre will add much to the increase. This is obvious from

the fact that the Mexican contains an excess of some constituents in which the Peruvian is deficient, so that a mixture will possess the valuable properties of both.

Peruvian guano is unquestionably the best possible manure for all plants that require manure at all, provided the soil is kept open by digging in leaves, vegetable rubbish, &c., from time to time. If the weather be dry, one of the best ways of using it is to dilute it with water and apply the solution thus obtained. A quart of the best guano may be dissolved in 30 gallons of water, and applied in quantity as circumstances may require, by means of a garden engine, liquid-manure cart, or a syringe. In this state of dilution, it can do no harm to the plants, not even to the more delicate kinds of flowers. D. J. B.

REMARKS ON FERTILIZERS, OR SALINE MANURES.

BY CHARLES T. JACKSON, OF BOSTON, MASSACHUSETTS.

Agriculturists are generally aware of the fact, that when soils have been cultivated for a certain length of time, and the crops sent away for consumption, that the soil becomes impoverished, and may ultimately be rendered barren. They are also aware of certain changes which result in the soil from long cultivation of particular crops, and that after a considerable length of time the soil will no longer advantageously continue to produce those crops. Few have investigated the nature of these changes, or are sufficiently acquainted with the chemistry of agriculture to be able to remedy the evil they have brought about.

By accurate chemical analyses of the ash of plants, and particularly of grains, we may learn what mineral substances they contain, and we know that those ingredients could only have been derived from the soil.

The ashes, or mineral residue of combustion of plants, therefore, deserves our particular attention, for the fixed mineral matters will be found in them. It is true that some of the salts which exist in plants are decomposed by combustion, but we can by analyses of the juices of plants, and sometimes by the analysis of the plant itself, find out the nature of those salts also. Thus, the salts formed with potash, soda, lime, oxides of iron, of manganese, magnesia, and ammonia, by the vegetable acids, and all ammoniacal compounds, will be decomposed by combustion, and the fixed alkaline matters, will be found in the ashes, in the state of carbonates, and the oxides of iron and manganese will occur as oxides, while the ammoniacal compounds will be entirely decomposed, and these products will be volatilized, or escape in a gaseous form.

It is obvious, then, that only a limited amount of knowledge is obtained by the analysis of the fixed salts in ashes; but still even that information has led to valuable practical results. There is yet a wide

field of inquiry open for the researches of chemists, who should devote their attention to the salts formed by the particular acids of different plants. Some of these salts are already known, as for instance, the bin-oxalate of potash in the rumex, oxalis, and rheum; of tartaric acid in the ribes, and the malic acid and these salts in the pyrus; also many of the less commonly known acids and their salts in medicinal plants; but the researches which have thus far been made have not been directed towards the improvement of practical agriculture, and it is in this point of view worthy of a long-continued series of new experiments; for we cannot safely generalize on the subject of the pabulum of plants, nor on their physiology, until this information is obtained. It is practicable, however, to make good use of the facts already eliminated, for it is perfectly obvious that there must be in the soil all the fixed bases and acids which we obtain from the ashes of plants that grew upon it, and if on analysis of the soil we find it deficient in any of them, we should supply to it the wanting ingredients.

In order to renovate a soil by restoring the substances removed from it by crops, we must also consider what state the matter should be in for the production of the best effects, and for long-continued action. This requires the joint efforts of the chemist and the farmer; for practical experiments in the field are necessary for the verification of the researches made in the laboratory; and several years or an entire rotation of crops is needed to render the value of a new method of manuring certain. By chemical analyses of ashes of our usual crops, we find the following fixed bases and acids:

Bases.—Potash, soda, lime, magnesia, oxides of iron and manganese.

Acids.—Phosphoric, silicic and sulphuric acids, and chlorine.

These ingredients are always found in the ashes of plants, and therefore they must be in the soil in which they exist, in various combinanations with each other, or with matters which plants do not take up. For instance, some of the acids may exist in the soil in combination with alumina, which is never found to be a compound of ashes. The acids and bases are not necessarily combined in the soil in accordance with those affinities which would rule if they were presented to each other in their separated state; for most of them are the components of minerals constituting a portion of the soil. Thus, instead of finding potash or soda combined with sulphuric acid, we generally find them in combination with silicic acid, from which they are slowly eliminated in the state of carbonates by the agency of carbonic acid, derived from sources that will be presently explained.

Phosphoric acid and chlorine are generally found in combination with lime, in the soil, while in the ashes of plants, most of the phosphoric acid is formed in combination with potash or soda. Sulphuric acid is found mostly combined with lime, but a little of it is also found combined with the alkalies, as is shown by analysis of water, which penetrates through the soil. If any portion of the sulphuric acid exists in the soil, combined with oxide of iron, it is undoubtedly decomposed by the action of ammonia, so that sulphate of ammonia would be absorbed by the plant, and not the injurious salt, sulphate of the oxide of iron. The oxides of iron and of manganese may be introduced in combination with the organic acids of humus, some of which are soluble; for

instance, the crenate of the protoxide of iron. Magnesia may be absorbed either as a bi-carbonate, sulphate of magnesia, or chloride of magnesium.

Silicic acid is probably introduced as a silicate of potash or soda, though it is possible that minute portions of gelatinous, or *nascent silica*, may be dissolved by water alone, or in the other saline solutions. Having once entered into the circulation of plants, a new set of chemical affinities called "vital" come to act upon these saline matters, and the laws of organic life, so little understood, make changes in their constitution, and produce results which have never yet been attained in the laboratory. The mode of action of saline matters in the economy of plants is not yet understood, but this much is known, that they are essential to the healthy growth of the plant, and the resulting saline products of the vegetable functions are found in every cell of its structure, and their distribution is made according to laws which have not yet been sufficiently investigated. On the epidermal surface of all the grasses and Cerealia, as well as the reed and rattan, we find a layer of silex, or flint, derived undoubtedly from the silicate of potash, or of soda absorbed from the soil by these plants. Whether it is set free by the chemical removal of the potash, by vegetable acids, or by the secreting power of the glands of the bark, is yet unknown; but we do know that this flinty support to the stems of those plants, which are wanting in woody fibre and a solid heart-wood interior, is necessary to enable them to bear their burden of grain or seed and their expanded foliage, as well as to strengthen and support their sap-vessels, and to protect them from the ravages of mildew and insects.

On looking into the usual constitution of soils, we find all the mineral ingredients of ashes sufficiently abundant, excepting the alkalies and phosphoric acid. It is generally safe, therefore, to introduce a larger portion of these matters in the manures we spread on our soils. They are found in ashes, guano, and super-phosphate of lime, which are now known to farmers as the most valuable of saline manures. A certain amount of vegetable mould, or humus, is necessary to the formation of a good and enduring soil; and though saline manures will often by themselves produce a good crop on a poor and apparently exhausted soil, they do nevertheless sometimes fail, owing to the want of a sufficiency of humus to retain the moisture requisite to healthy vegetation, as also for the production, by slow oxidation, of carbonic acid gas required for the foliage. It is proper, on poor soils, to mix the saline manures with vegetable composts. When vegetable matters are allowed to undergo changes in a moist soil, there are various products formed during their fermentation, putrefaction, and eremacausis, or slow combustion. The first changes which take place are properly those of fermentation, during which acetic acid, or vinegar, is formed. This is more abundantly produced by the fermentation of vegetables containing saccharine and amylaceous matters. During this stage of fermentation, vegetable matters act injuriously on living plants, the acetic acid being to most of them poisonous. This fact most farmers recognize in the sterility produced by pomace, or the refuse of the cider-press, and in the destruction of grass around a decaying or rotten tree which lies in the field or in the forest, undergoing its first fermentation.

The next change is one of a different nature, in which the fibre of

the wood becomes brown and rotten. Ulmic acid is now formed, and next humic, crenic and apocrenic acids result from still further changes of ligneous matter. It will thus be seen that all the processes of decay of vegetable matter result in the fermentation of acids, and the ultimate eremacausis, or slow combustion by the action of the air, produces carbonic acid gas.

Acid matters of all kinds tend to decompose the minerals of the soil, and that decomposition results in the elimination in an available form for vegetable nutrition of the alkaline matters of calcareous rocks and their debris, which constitute the mineral bases of all soils. Ulmic, humic, crenic, and apocrenic acids readily act on rocks, extracting the metallic oxides, the calcareous matters, and the alkalies. This has been undoubtedly noticed by those who have examined pieces of granite, limestone, or of other rocks containing these matters, which are dug out from peat bogs where these vegetable acids are abundantly contained. Rocks, before ferruginous and brown, come out of peat perfectly white, and granite has its felspar and mica decomposed and their alkalies extracted, while only pulverulent mica remains. A rock containing limestone is found deprived of it, and cavities are left where the calcareous matter formerly existed. In a similar manner all recent vegetable mould acts on the comminuted minerals of the soil, disengaging from them their alkaline ingredients.

A still further change, taking place more readily in arable soils, is the slow oxidation of vegetable mould, producing carbonic acid gas, which is also an active decomposer of silicates of the alkalies, and a solvent of carbonate of lime. This decomposing agency of carbonic acid gas is one which is constantly at work during the fallowing of a soil, but it is not the only agency that is operating to renovate the land; for meanwhile the argillaceous and ferruginous matters are busily engaged in absorbing the minute quantities of ammonia, and ammonia, producing amides, which descend with the falling rains, and numerous and complicated exchanges of elements are taking place among the salts in the soil.

Vegetable matters, as above stated, always form acids or electro-negative substances. Animal matters, by their decay, produce alkaline or electro-positive matters, chiefly ammonia and basic salts. Hence, it is obvious that when vegetable and animal matters are mixed together, we shall have a combination between the acids and alkalies, resulting in the formation of neutral salts; and since the vegetable acids have an active affinity for ammonia, with which they readily combine, they will prevent the escape of this valuable gaseous manure and preserve it in its most available condition for the nutrition of plants; for it has been ascertained, experimentally, that ammonia, in combination with humic, crenic and apocrenic acids is actually absorbed and digested by plants, both the organic acids and the ammonia being retained, while the plants absorbing these matters grow with increased luxuriance.

Chemistry has verified and justified the experience of ages as to the importance of composting vegetable and animal matters together in the manure heap, so as to retain, in proper combinations, the most valuable fertilizers; but farmers are not generally informed as to the *rationale*

of operations which they daily perform, and hence often commit grave errors by not understanding the principles involved in their operations. Liquid manure from the stalls, or urine, is too often allowed to escape and waste itself in the drains, because the farmer is not aware of the fact that it is equivalent to a saturated aqueous solution of the best Peruvian guano, containing both ammonia-producing materials, and the phosphates of lime and of the alkalies. Liquid manures form a good ferment to mingle with the vegetable matters of the compost heap, and should be employed for that purpose.

Caustic lime and the fixed alkalies should never be introduced into any manure heap consisting chiefly of animal matters unless an abundance of acid peat or swamp muck is ready to be used immediately to absorb the disengaged ammonia by covering the manure heap with a thick layer of it. In such cases, lime recently slaked may be sometimes advantageously employed in distributing the ammonia through a mass of peat, which is then to be mixed with the whole manure heap to form a compost. The cases where lime is required to be used in this manner are not unfrequent, as, for instance, where animal offal or night-soil is composted, the odor of the manure heap in such cases being unsupportable.

By throwing in a liberal supply of recently-slaked lime, and covering the whole heap with a layer of moist peat, swamp muck, or of rotten wood, all the ammonia will be saved, and the compost will no longer be found to be offensive. It is also useful to mix from 10 to 20 per cent. of ground gypsum with the peat, so as to render it still more strongly absorbent of ammonia. Gypsum, alone, will not be found to answer the purpose, since the ammonia will readily escape through it; but when mixed with moist peat it is very active.

Concentrated fertilizers, such as guano, super-phosphate of lime, and sulphate of ammonia are now extensively used, especially by the Southern planters, who, not keeping their cattle in stalls, have no barnyard dung. These concentrated manures generally prove efficient, but in dry seasons their effects are not so valuable as the compost from the barn-yard, probably owing to their having no power to retain moisture, while vegetable composts have strong hygrometric or absorbing properties. Hence, it is proper to compost the concentrated manures by mixing them with an adequate amount of vegetable mould. In many cases, the planter cannot obtain either peat or swamp muck, and hence cannot follow the method laid down in this paper. He can, however, raise green crops of spurry, field peas, buckwheat, or of clover, and turn in those crops so as to supply the soil with vegetable mould. When this is done, he may rely upon the fertilizing effects of his concentrated manures, since vegetable mould will retain moisture during an ordinary drought, peat retaining at least 25 per cent. of water when apparently dry. Ashes, where they can be obtained in sufficient quantities either recent or leached, are a very valuable manure on sandy loams or dry soil of any kind, but they do not operate favorably on wet or cold clayey soils, but are very favorable to those consisting chiefly of fine silicious sand. On such soils, if there are also 2 or 3 per cent. of vegetable matter present, ashes alone are a perfect

amendment and manure, capable of supplying the usual crops for a great number of years.

Undoubtedly guano and super-phosphate of lime would add much to the fertility of such soils in ordinary seasons, but they would be liable to fail in one of severe drought, unless they should be supported by a liberal dressing of composted manure or an adequate supply of vegetable mould.

In England and France attention has recently been turned to the manufacture of an artificial guano directly from fishes, after extracting the 2 or 3 per cent. of oil which they contain. The remaining cooked fish, after heavy pressure, is ground and dried in an oven, then packed up to be sold for manure, which has proved more valuable than guano.

In this country, a company has been formed in Rhode Island for the manufacture of fish manure, and the fat menhaden of Providence river and Long Island sound will be used to produce both oil and fish-cake, and the latter being duly prepared so as to render it inodorous, will be sent into the agricultural market as an artificial guano. I have no doubt of the high fertilizing effects which this manure is capable of producing, nor of the economy of the manufacture proposed. There are doubtless many harbors on our sea coast where adequate supplies of fish may be obtained for the manufacture of guano, superior to that imported from the islands on the coast of Peru, and it is to be hoped that these home resources may be rendered available to the farmer as well as to the fisherman.

Fish manures contain phosphates of lime, magnesia, potash, soda, and ammonia, and all the nitrogen-producing materials required for the production of ammonia in the soil as needed, besides which the carbonaceous matters of their fibrine and cellular tissues will produce a rich mould charged with nitrogenous matters. In case the fish-cake is saturated with sulphuric acid, the ammonia would combine to form sulphate of ammonia, which is known to be a valuable fertilizer. If more sulphuric acid be present than is required to form sulphate of ammonia, it will act on the bones of the fishes to form super-phosphate of lime, which is also a well-known fertilizer in high repute.

Since artificial guano, made directly from fishes, will contain a larger amount of nitrogenous or ammonia-producing matters than any natural guano known, it is obvious that it will require very large dilution or admixture with peat, swamp muck, vegetable mould, or common earth, before it is mingled with the soil, since it would prove too powerful an agent to come directly in contact with the seeds; for it would act upon them more strongly than even the best guano from Peru.

All substances which will generate ammonia are known to be valuable manures, for they supply nitrogen and elements which the plant has not the power to draw from the atmosphere, and which is supplied in very minute quantities only, by the ammonia producing matters brought down by rain in quantities too small for cultivated fields. Hence the necessity of an artificial supply of nitrogenous substances to the cultivated soil.

We have to furnish to the field those ingredients which are most needed by plants, and which are found quite sparingly in natural soils.

These matters are phosphate of lime and magnesia, potash, soda, lime, sulphates, chlorides, and ammonia, and a proper supply of humus, or vegetable mould. The other matters introduced into a soil are classed as mechanical or physical amendments, and affect principally the texture and physical properties of a soil. They are frequently as valuable as the manures themselves, in giving the soil its best mechanical qualities as to structure, dryness, or moisture, retentiveness of heat, offering also a proper degree of porosity, so as to enable the air to penetrate to matters requiring oxidation in the soil. Charcoal powder acts mechanically in absorbing ammoniacal gas, and also by its color in absorbing the heat of the sun's rays, and retaining the heat by imperfect conduction. When the charcoal is burned only to brownness, then it acts also chemically, being in a condition to form humus, and to undergo oxidation by the action of the atmosphere. Charcoal is undoubtedly a powerful fertilizer, and one of great duration, as is shown by the continued fertility of places where the aboriginal inhabitants of New England built their camp-fires more than two hundred years ago, while nothing peculiar to those spots can be discovered beyond the admixture of large quantities of charcoal and clam-shells with the soil.

It would seem from the persistent effects of charcoal, that it acts by catalysis, or mere presence; that is, not being consumed itself, but serving convey other molecules to the plants, and of effecting chemical changes. This force, though not fully understood, is one recognised in chemistry, and it undoubtedly plays its part in the soil, and probably in the functions of vegetable economy.

Carbonate of lime, (shells, marl, or limestone,) in excess is also highly useful in any soil, as it stands ready to take up any acid matters, whether of vegetable or mineral origin, and on combining with them gives out carbonic acid, which goes not only to decompose silicates, but also rises through the soil to nourish the foliage of growing plants.

Clay acts mechanically by giving consistency to the soil, retaining moisture, and absorbing ammonia, and also when consisting of partially-decomposed and decomposing minerals, it is capable of furnishing potash, soda, and some phosphoric acid; but alumina, its basis, is not an ingredient of any plant, and has never been discovered in the ashes.

ON THE FERTILIZERS FOR FRUIT TREES.

BY MARSHALL P. WILDER, OF BOSTON, MASSACHUSETTS.

In relation to appropriate fertilizers for fruit trees a diversity of opinion prevails. All agree that certain substances exist in plants and trees, and that these must be contained in the soil to produce growth, elaboration, and perfection. To supply these, some advocate the use of what are termed "special manures," others ridicule the idea. I would suggest whether this is not a difference in language, rather than

in principle; for in special fertilizers, the first make simply those which correspond with the constituents of the crop; but are not the second careful to select and apply manures which contain those elements? and do they not, in practice, affix the seal of their approbation to the theory which they oppose? Explode this doctrine, and do you not destroy the principle of manuring and the necessity of a rotation of crops? Trees exhaust the soil of certain ingredients, and, like animals, must have their appropriate food. All know how difficult it is to make a fruit tree flourish on the spot from which an old tree of the same species has been removed.

The great practical question now agitating the community is, How shall we ascertain what fertilizing elements are appropriate to a particular species of vegetation? To this two replies are rendered. Some say, analyze the crop; others, the soil. Each, I think, maintains a truth; and both together, nearly the whole truth. We need the analysis of the crop to teach us its ingredients, and that of the soil to ascertain whether it contains those ingredients; and if it does not, what fertilizers must be applied to supply them. Thus, by analysis, we learn that nearly a quarter part of the constituents of the pear, the grape, and the strawberry consists of potash. This abounds in new soils, and peculiarly adapts them to the production of these fruits, but having been extracted from soils long under cultivation, it is supplied by wood ashes or potash, the value of which has of late greatly increased in the estimation of cultivators.

Among the arts of modern cultivation, universal experience attests to the great advantage of "mulching" the soil around fruit tress, as a means of fertilization and of preservation from drought and heat, so common with us in midsummer. In illustration of this, experiment has proved that on dry soils, where the earth has been strewn with straw, the crops have been as large without manure as with it, where evaporation has disengaged the fertilizing elements of the soil.

LIGHT AND SHADE—THEIR INFLUENCE ON VEGETATION.

Light produced by the rays of the sun is a most important agent in the development of plants, the green color of their leaves, fruits, twigs, &c., being generated by its action; but it is not necessary to have the direct solar beam—diffuse daylight is sufficient—although the action is not, in this case, so rapid and energetic as when aided by the bright rays of the sun. Mould and some kinds of mushrooms, however, grow and thrive without light. It is a well known fact, that most of the mushrooms used in Paris are grown in the catacombs under that city, where the light of the sun is never seen; but trees and the plants usually cultivated cannot long exist in a healthy state without its presence.

All green and living plants exposed to the light, and living upon atmospheric air, obtain most of their carbon from its carbonic acid,

(which they imbibe and decompose,) their hydrogen from its moisture, and their nitrogen partly from the ammoniacal vapor which therein exists. But in the absence of light, oxygen is withdrawn from the air, the carbonic acid emitted, and plants in the dark deteriorate the air in which they are confined; whereas, when exposed under the open canopy of heaven to the alternations of light and darkness, sunshine and gloom, exactly the reverse is the case. Hence we have the fullest reason to believe that plants are nourished by the carbonic acid of the atmosphere, which is absorbed directly by their leaves from the surrounding air, and also by their roots, when dissolved in rain-water; and further, that the rapidity of the decomposition bears a direct relation to the intensity of the light.

In the tropics, for instance, vegetation is wonderfully active, and this is due as much to the brighter sunshine as to the more elevated temperature of these parts. There is no difficulty in obtaining in a stove, nor in a conservatory, an atmosphere as warm, and, if necessary, as moist as may be desired, and the plants of hot countries may be cultivated with a certain degree of success in such a situation; but they never exhibit the thriving and beautiful appearance, the deep-green color, characteristic of health, belonging to them in their natural state. We may substitute artificial warmth for that of the sun, but we cannot supply the place of its light.

How necessary light is to the health of plants may be inferred from the eagerness with which they appear to long for it. How intensely does the sunflower watch the daily course of the sun! How do the countless blossoms nightly droop when he retires, and the blanched plant strive to reach an open chink through which his light may reach it! Thus a potato has been observed to grow up in quest of light from the bottom of a well twelve feet deep; and in a dark cellar a shoot of twenty feet in length has been met with, the extremity of which had reached and rested at an open window.

That the warmth of the sun has comparatively little to do with this specific action of his rays on the chemical functions of the leaf is illustrated by some interesting experiments of Mr. R. Hunt, of England, on the effect of rays of light of different colors on the growing plant. He sowed cress seed, and exposed different portions of the soil in which the seeds were germinating to the action of the red, yellow, green and blue rays, which were transmitted by equal thicknesses of solutions of these several colors. "After ten days, there was under the blue fluid a crop of cress of as bright a green as any which grew in full light, and far more abundant. The crop was scanty under the green fluid, and of a pale-yellow, unhealthy color. Under the yellow solution, only two or three plants appeared, but less pale than those under the green, while beneath the red a few more plants came up than under the yellow, though they were also of an unhealthy color. The red and blue bottles being now mutually transferred, the crop formerly beneath the blue in a few days appeared blighted, while on the patch previously exposed to the red, some additional plants sprung up." From the result of these experiments, it has been recommended that a cheap blue glass be employed for glazing hot-houses, conservatories, &c., instead of the kind in common use.

Besides the rays of heat and of light, the sunbeam contains what have been called "chemical rays," not distinguishable by our senses, but capable of being recognized by the chemical effects they produce. These rays appear to differ in kind, as the rays of different-colored light. It is to the action of these chemical rays on the leaf, and especially to those which are associated with the blue light in their solar beam, that the chemical influence of the sun on the functions of the leaf is principally to be ascribed.

On the contrary, there are important relations in respect to *shade*, which necessarily have influence upon the power of promoting vegetation. Every farmer knows, that when a soil has been shaded for a considerable time by a dense crop of clover, ray-grass, hemp, turnips, cabbages, peas, &c., or is covered by buildings, boards, stones, shavings, sawdust, tan-bark, chaff, straw, coarse hay, or other fibrous matter, though naturally hard and stiff, becomes mellow, soft and free, and obviously is in a state of fermentation. This may be accounted for on the principle that putrefaction, or solution of vegetable substances in the soil, is more readily promoted by a close or stagnated state of the air, than by a constant supply and addition of oxygen from a pure atmosphere; or, in other words, that such a covering will prevent the excessive exhalation of moisture, nitrogen, hydrogen, and carbonic acid gases, which accumulate and thereby promote the putrefaction or decomposition of vegetable matters, and thus enrich the soil.

It is upon this principle, that the new and peculiar kind of manuring, called *Gurneyism*, depends, which is stated to have been employed with signal success, by Mr. Gurney, a farmer of East Cornwall, in England, some years since. The operation consists in covering grass lands with long straw, coarse hay, or other fibrous matter, which is allowed to remain upon the ground until the grass springs through it to the desired height, and then raking it off and spreading it on another portion of the field, the operation being repeated as long as the straw or hay remains sufficiently entire to be conveniently applied. It is upon the same principle, too, that orchards and fruit trees are rendered more productive by *mulching* with straw or refuse hay around their trunks and over their roots; and from this, and other causes, the quality of a poor, thin, unproductive soil, which has been for some time shaded by a brush wood or a dense forest, is materially improved. In a forest, however, all other vegetation being prevented, the land besides receiving a yearly manuring of vegetable mould from the fallen leaves, is caused to be many years in uninterrupted fallow; and is sheltered, also, from the beating of rain drops, which slowly and gently descend upon it, fraught with principles of fertility, instead of washing out the valuable saline matter it may contain. Beneath the overshadowing branches of a forest, too, the soil is also protected from the wind, and to this protection, Sprengel attributes much of that rapid improvement so generally experienced where lands are covered with woods. The winds carry along with them earthy matter, which they again deposit in the still forest, and thus gradually form a soil even in places where it is the most bare.

Independent of the above considerations, *shade* is necessary for all plants in their infancy, when they are diseased, or when they have suffered violence by removal. Seeds germinate best in obscurity, and

young plants thrive better when shaded for a few days after they are up. The clouds often furnish such shade; but art may use means to give it to them. Seeds that are necessary to be sown on the surface, or with a little earth over them, also grow best if shaded for a time. Shade, too, is necessary for such plants as it is desirable to prolong their freshness and flowering; and it is equally important, and almost indispensable, to all cuttings, or slips, in order that they may root well. But plants in the light purify the air by absorbing carbonic acid and disengaging their oxygen, and at night they corrupt the air by suffering carbonic acid to escape without being decomposed.

D. J. B.

CONDENSED CORRESPONDENCE.

Statement of J. H. Forman, *of Oak Bowery, Chambers county, Alabama.*

The fertilizers most in use with us are cotton seed and stable or lot manure, obtained by strewing our stable-yards where our animals are kept with straw, leaves, or some other absorbent; and when mixed with, or saturated by, excretions is put in pens or heaps to decompose. It is then applied, either broadcast and ploughed in, or put in the hills with the seed. Some prefer using it in its crude state; that is, without decomposition, placing it in a deep furrow in the winter and covering it with the plough, and in the spring planting the seed upon or near it. Cotton seed is used in the same way; that is, covered with the plough, either in winter without decomposing, or at the time of planting—which latter process requires partial decomposition to prevent vegetating. The last mode stimulates the early growth of the plants, but is too apt to become exhausted before maturity; while the first is believed to produce a more lasting effect, and is better adapted to dry seasons.

Some experiments have been made with guano on cotton and corn; but with doubtful success, the early growth of the crops exciting high hopes only to suffer disappointment. Its high price, $4 per hundred, will exclude it from this region. The artificial manures are not used here in consequence of expense; and as land is low, say from $5 to $15 per acre, fallows will continue to be substituted for fertilizers.

Statement of Ralph R. Phelps, *of Manchester, Hartford County, Connecticut.*

The barn-yard and hog-pen have been the principal sources of manure among the farmers of this region.

I have tried lime in the compost heaps with beneficial results; but when it is applied directly to the land, I have discovered no good effects except upon apple-trees. Gypsum was formerly used with remarkable effect, and is still applied to some extent, but with greatly diminished benefit. Whether this is owing to the inferior quality of the article or to some other cause, I am unable to say.

Guano has been used here to a limited extent, but not long enough to convince us of the economy of its use at present prices. On the buckwheat crops the effect of 100 pounds to the acre is surprising.

In September last, I sowed a lot with wheat, on the two sides of which I applied Peruvian guano at the rate of 275 pounds to the acre; and in the centre super-phosphate of lime at the rate of 250 pounds, together with 2½ bushels of common salt, to the acre. These were all sowed with the seed, and worked in with the cultivator and harrow. When the winter set in, all the wheat looked well, but with a marked ifference in favor of the guano.

My mode of preparing and keeping manure is as follows: I have vault under my stables, flagged with flat stones, where the manure is thrown, through scuttles in the floor. This vault is cleaned out in the fall, and the contents spread on grass-land; and for the want of muck, the flagging is covered, say six inches deep with turf and loam from under the fences or from the sides of the road. The manure is thrown on this covering, which serves to absorb the liquid portion. If a thaw occurs in the winter, more loam is thrown in, and in the spring the manure is levelled, and covered with another coat of the same substance. I keep my working oxen and horses in the stable during the summer, and dispose of their manure in the same manner, a load of turf or loam being thrown into the stables for them to stand and lie upon. In the fall, I find the whole mass a valuable manure, and if pitched over and well worked, it is still better. I consider one load of manure kept in this way worth two loads thrown into the yard in the usual way, to say nothing of the increased quantity obtained. I am aware that this method is considered, by some, detrimental to the health of the cattle. I can only say that my cattle have always been healthy during more than forty years, in which I have pursued this course. Gypsum, or some other disinfecting substance, will prevent unpleasant odors, and keep the air of the stable wholesome. Carrying the manure to a distant shed has been recommended, but this seems to me too expensive for small farmers. If hogs can have access to the vault, the manure will be improved.

I apply manure to grass-lands in the fall rather than in the spring, for several reasons. It is more conveniently done in the fall; farmers are then less crowded with work; teams are stronger; the ground is less liable to be cut up by the wheels; and the manure seems to protect the roots of the grass from the severity of our winters, so that the grass starts earlier in the spring and produces a better crop.

After cleaning my barn, sheep and hog yards, in the spring, I cast loam and turf into them, and add more, as I have opportunity, during the summer; also, occasionally ploughing the barn-yard. In the fall, I add potato vines, weeds, leaves, and whatever refuse vegetable matter I can procure. In the spring, as soon as the frost is out, the whole mass is overhauled, mixed, and thrown into a large heap. By planting time, the fermentation which takes place will have sufficiently decomposed the vegetable matter to plough under for corn and root crops. In this way, I obtain double the quantity of manure I should get in the ordinary way.

Statement of John Finlayson, *of Aucilla, Jefferson county, Florida.*

Owing to the natural fertility of our soil, we have done but little yet in the way of manuring, except with cotton seed, and such as naturally accumulates in our stables and lots. I would remark that the cow-pea, as a renovating crop, I much esteem. It should be planted as early as the month of May, among the corn crop. If planted by that time, and an extra working given it after the corn has been laid by, the grass does not overrun it. It yields a heavy crop of vines, and is the best fertilizer, I think, that can be applied, particularly to our clay lands. I mean by clay lands, those having the clay near the surface, without the soil being washed away. Even that having the soil washed away can be vastly improved by a succession of two or three crops of peas, especially if ploughed in while green.

Statement of Hon. Joel Crawford, *of Blakely, Early county, Georgia.*

But little manure of any sort has been applied to the fields of this county. The scanty scrapings of our stables and barn-yards are spread on a few acres; and cotton seed, which abounds in nitrogen, is extensively used for enriching the lands on which is grown Indian corn. A few planters have made experiments with guano and phosphate of lime, in most cases with marked increase of crops.

Statement of Joseph C. Orth, *of McCleary's Bluff, Wabash county, Illinois.*

But little use of manure is made here, many farmers not even saving their stable dung. For garden purposes, some few have used guano with very good results. For field use, stable manures are applied with signal advantage in every instance where the ground is not too wet.

Statement of A. J. Boone, *of Lebanon, Boone county, Indiana.*

Except straw and stable manure, none is used to any extent. These are found valuable in the production of our leading staples. Our soil is of very rich quality, based on a stratum of clay, and the oldest improvements date back to 1829 or 1830, and the largest portion only a few years, so that the application of manures has not yet become a matter of seeming importance. From the level character of the surface and the the clayey base of the soil, under ground ditches for surface draining and ventilation are found by experiment to be of very great advantage to all kinds of crops. This loose, spongy soil is rendered very productive and easy to work by ditching. Lands considered dry are improved by it, and crops, in very many instances, have been doubled, and, in some instances, quadrupled by this process alone. It is more productive, and in every way more easy and comfortable to work.

Statement of William J. Payne, *of Rushville, Rush county, Indiana.*

Stable dung is the best manure we have in this county for corn. Fifteen loads to the acre will increase the product from 10 to 30 per cent. on any ordinary soil if the season is not too dry.

An inverted clover sod is the surest and best manure for wheat. It will increase the yield from 15 to 40 per cent. Next to this, wood ashes are best for wheat.

Statement of Samuel D. Martin, *near Pine Grove, Clarke county, Kentucky.*

Red clover is the only plant cultivated with a view to ploughing under, and this is not extensively practised. It enters largely into our rotation of crops, but instead of being ploughed under it is grazed off by hogs, cattle, sheep, or horses, and after two years, is ploughed up for raising some other crop.

Rye is sometimes sown upon ground in the fall, and ploughed under in the spring as a preparation for a hemp crop.

Statement of L. Rathbun, *of Bellevue, Bossier parish, Louisiana.*

No manures are used in this parish except cotton seed and that from our cattle yards; and very few take the trouble to save the latter. Cotton seed, when it accumulates around our gin-houses in such quantities that it is in the way, is removed by our planters to their fields for manure. It serves as an excellent fertilizer for corn, but is thought to breed insects in cotton.

Statement of Howard M. Atkins, *of Mount Vernon, Kennebec county, Maine.*

Barn and pigyard manure, swamp and pond muck, lime and gypsum are the principal fertilizers used here. Barnyard dung is employed for all kinds of crops; hog manure is used almost entirely for corn in the hill; muck is hauled into the yard and allowed to lay and become mixed with the manure, and then carted into the field to be applied to various crops, or it is composted with gypsum, ashes, or lime, and then applied. Treated either way, it is an excellent fertilizer. Gypsum is universally used for potatoes and corn with good effect.

Statement of Francis Fuller, *of Winthrop, Kennebec county, Maine.*

The manures most used among us are those made by our cattle and hogs. Muck, ashes, and lime are often mingled with our cattle manure in making a compost, notwithstanding the loss sustained by liberating the ammonia from the dung, by means of the ashes and lime.

Guano, bone-dust, poudrette, super-phosphate of lime, charcoal, and fish, as yet, are but little used. Gypsum is employed with success in

our grass, corn and potato crops. Lime is used in the preparation of seed wheat. Experiments have been made, which prove, that where muck can easily be obtained and put into the pig-sty, or barn-yard, the compost will cost only 37½ cents a load of 40 bushels. Our composts are generally spread upon the ground, and then ploughed or harrowed in; although it is a common practice to apply them in the hill for potatoes and corn. Gypsum is spread broadcast on our grass-lands, at the rate of one to two bushels to the acre. It cost about $7 per ton of 24 bushels.

In some instances, buckwheat has been ploughed under as a manure; but red clover has generally been employed for this purpose.

Statement of EUSEBIUS WESTON, *of Bloomfield, Somerset county, Maine.*

Barnyard manure is the principal dependence of our farmers. Bog-earth, bone-dust, guano, and the artificial fertilizers are new to them. But the public mind is becoming awakened to the subject, and their use is fast increasing. Gypsum is considerably used, especially on broken sward land, for potatoes and wheat. It succeeds well in grass land. The crops cultivated for ploughing under, are clover, oats, and buckwheat.

Statement of WILLIAM BACON, *of Richmond, Berkshire county, Massachusetts.*

Much attention is paid here to increasing, and prudently saving the manure of the barn and stables; and for this purpose, nearly all farmers are in the habit of drawing up muck, turf, and weeds, which absorb the juices of the yard, when ploughed in, as all coarse manure should be.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Although particular fertilizers, applied to growing crops on the principle of supplying such chemical substances as each peculiar vegetable may most require, or any particular soil may be most deficient in, are often of great service, my experience teaches me that entire dependence should not be placed on them. To make a fertile soil out of a hard, cold sub-soil, something more than guano, super-phosphate of lime, or gypsum is requisite. Every soil needs vegetable mould to render it fruitful, and this must be supplied where it is wanting. Lands which are continually ploughed are constantly losing this indispensable ingredient. When soils are exposed during the summer to the rays of the sun, especially when lying in furrows, the vegetable matter seems to be burned up or dissipated, and thus they are exhausted or worn out. For this reason corn, tobacco, cotton, potatoes, and all crops which require a continual stirring of the earth in their cultivation, are found rapidly to exhaust the soil, not only by appropriating the substances necessary for their nourishment, but also by the great exposure to which the soil is subjected. If a proper supply of this mould can

be preserved in a soil it might be yearly cultivated, for ages, and still remain fertile. All decaying vegetable and animal substances assist in keeping up this supply. Manure from the farm-yard, hog-pen, and muck from the swamps, are all excellent so far as they go; but farmers in this part of the country cannot get enough of these to preserve the fertility of their entire farms. I have seen acres of red clover turned under; but without any very satisfactory results. Next to farmyard manure, I think a good tough sod ploughed under is the best fertilizer. When it becomes well rotted we always expect a heavy crop to follow. But some farmers do not like to wait for this, and consequently have recourse to guano, gypsum, &c.; but if they continue to rely on them their farms soon become worn out, and when they have been brought to such a state it is not easy to render them fertile again, except by a plentiful use of farmyard manure; for although a good sod of clover is not long in forming in rich soil, yet when the latter is once exhausted it will hardly form at all.

Statement of S. S. G. Franklin, *of Cuba, Clinton county, Ohio.*

I am not aware that any guano or bone-dust is used here. Our main dependence for manure is the barn-yard, where the straw, corn-stalks, and refuse vegetables of every kind are collected. Lime is sometimes used with good effect. For potatoes, I use ashes, which prove successful. A plenty of barnyard manure will insure a good crop of Indian corn in anything like a good season. It should be hauled out in the spring and immediately ploughed under. Clover is the best manure we have for wheat.

Statement of Elias Green, *of Wakeman, Huron county, Ohio.*

As yet, manuring is much neglected by our farmers. Scarcely any fertilizer is used except barnyard and stable manure. I have applied unleached ashes to my meadow land with surprizing effects. Ashes are also excellent for fruit trees. Three years ago, I put two or three bushels of unleached ashes about the roots of an old decaying apple-tree, which, for some years previously had borne but two or three bushels of fruit annually—last fall I picked from the tree 11 bushels of good-sized apples, much improved in flavor. The ashes were thoroughly mixed with the earth by means of a hoe.

Statement of Isaac R. Evans, *of Harrisville, Butler county, Pennsylvania.*

Considerable interest is manifested by our farmers upon the subject of manures. They devote their attention as carefully and regularly to collecting and saving all kinds of vegetable matter to be procured as to the more indispensable labors of the farm. Lime is applied to corn ground, after it is ploughed, at the rate of 75 to 100 bushels to the acre. The ground is then thoroughly harrowed before planting. For wheat

on fallow land, 100 bushels are spread to each acre in August previous to sowing.

Statement of George Buchanan, Samuel Gilliland, James T. Hale, David Duncan, William P. Fisher, *being that portion of their report which relates to manures, addressed to the Centre County Agricultural Society of Pennsylvania.*

Our soil being strong limestone, combined with clay and slate, is kept improved by barnyard manure and clover. Guano and artificial fertilizers are not much introduced among us, and hence we depend upon our own resources for enriching our land.

Statement of Raleigh W. Dyer, *of Prillaman's, Franklin county, Virginia.*

The fertilizers most in use in this vicinity are stable, barnyard and hogpen manures, with the stubble, grass, clover, and weeds of grain lands turned under in the fall. As to the value of the different kinds for special crops, the most of our farmers differ in their estimates; the reason of which difference is to be found in the fact that there is hardly three of them who apply it alike in any particular. My own opinion, founded partly on experience and partly on observation, is, that for wheat, rye, and oats, ashes, clover, and green sward, are preferable to all other kinds in use among us; and that for corn, tobacco, grass, and garden vegetables generally, the stable, barnyard, and hogpen manures are the best.

Lime has been tried in this section on a small scale.

Plaster has been used moderately, but as it regards anything other than clover, I think its good effects remain entirely in the dark. If it is sown on clover lands in the spring of the second year of its growth, I believe that the profit derived from its application will amount to at least 300 per cent. on the capital invested.

I have frequently witnessed the good effects of wheat, oats and rye straw, when scattered over the ground in a raw state, and turned under to the depth of 8 or 10 inches, more particularly upon lands of a stiff, hard, and tenacious character.

Corn-shucks, when our cattle can spare them, are also an excellent renovator. When intended for corn, tobacco, or potatoes, they should, if possible, be turned under the fall or summer before planting, as their effects on the first crop will be sooner perceived for wheat or rye.

Muck, when to be had in sufficient quantities, is an excellent renovator for all kinds of land in this vicinity, though it has never yet been brought into general use, owing to the hardships incident to its application.

In applying manures of any description, I think the broadcast system preferable to any other. The land, when manured in this manner, is all acted upon at the same time and in the same manner, which, for general purposes, and particularly for small grain crops, is a considera-

tion of great value. The system of applying manure to corn in the hill is, I think, attended with several evils, the greatest of which is the great danger you subject the plants to in case of a drought, and the fact that it takes at least two years to get the manure scattered and mixed with the land, so as to be generally productive and remunerative.

IMPROVEMENT OF LAND.

CONDENSED CORRESPONDENCE.

Statement of Raleigh W. Dyer, *of Prillaman's, Franklin county, Virginia.*

For the improvement of lands of almost every description, after applying all the manure that can be spared, deep ploughing and under-draining should not be forgotten. They not only improve the land dollar upon dollar, but the crops are augmented often fifty or one hundred fold. After being thoroughly broken and pulverized to a proper depth, the land is easier worked during the year, absorbs more water, admits the air more freely to the roots of plants, and causes them to stand better the drought.

ROTATION OF CROPS.

The experience of husbandmen, from the earliest times, has shown that the same kinds of plants, with some exceptions, cannot be cultivated advantageously in continued succession on the same soil. The same or similar species have a tendency to grow feebly, degenerate, or become more subject to diseases, when cultivated consecutively upon the same ground; and hence the rule which forms the basis of a system of regular alternations of crops is, that plants of the same or allied species are not to be grown in immediate succession; and furthermore, the same rule would imply that similar kinds of crops should recur at as distant intervals of the course as circumstances will allow.

As no particular systems of rotation have as yet been established in the United States, those in the following tables are offered for the consideration of the cultivator until better ones can be found. It is to be understood, however, that they are adapted only to strong virgin soils, or to older ones maintained in good tilth by the aid of manures.

When tobacco, hemp, cotton, or sugar cane, is to be cultivated, a place should be assigned for it according as it is raised as a green crop for its fibre or for its seeds. Thus, in the tables, cotton or hemp cultivated for their seeds may take the place of wheat or Indian corn; and tobacco may follow either by again restoring the soil with manure.

By the following tables there is exhibited at one view the crops which may succeed each other for ten consecutive years on three general classes of soil. For instance, to commence with flax, clover, or carrots, in the second table, wheat, Indian corn, oats, or barley and turnips, may be cultivated the second year, rye and turnips may be cultivated after wheat or Indian corn the third year, and rye or carrots after barley and turnips the third year. Rye, or barley and turnips, may be cultivated after rye and turnips the fourth year, and potatoes after rye, carrots, barley, and turnips, and rye or carrots the fourth year.

In like manner proceed in the other tables, continuing horizontally in a direct line across them until the tenth year is reached, when the course of rotation is commenced anew, &c.

D. J. B.

I. *Table of rotations for a good clay or strong loam.*

First year.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.
		Oats.	Carrots, or barley and turnips.	Wheat or Indian corn.	Rye and turnips.	Potatoes.	Wheat or Indian corn.	Rye and turnips.	Flax.
				Beans.	Wheat or Indian corn.	Rye and turnips.	Potatoes.	Rape or carrots.	Flax.
	Clover.	Barley and turnips.	Rape, carrots, or beans.	Wheat or Indian corn.	Rye and turnips.	Potatoes.	Rye and turnips, wheat or Indian corn.	Oats or flax; rye, or barley and turnips.	Flax.
FLAX..........	Wheat or Indian corn.	Barley.	Beans.	Wheat or Indian corn.	Rye and turnips.	Potatoes.	Rape and turnips.	Oats or flax.	Clover.
		Rye and turnips.	Oats, clover, or potatoes.	Clover, rape and turnips.	Wheat or Indian corn.	Rye and turnips.	Flax.	Barley.	Rape, carrots, or beans.
	Rape and turnips.*	Wheat or Indian corn.	Rye and turnips.	Oats.	Clover.	Wheat or Indian corn.	Rye, or barley and turnips.	Oats or flax.	Clover.

* It is to be understood that wherever turnips are associated with any plant, they are to be sown in July, August, or September, after harvesting the other crop.

II. *Table of rotations for the richest kind of light soil.*

First year.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.
	Wheat or Indian corn.	Rye and turnips.	Rye, barley and turnips.	Potatoes.	Wheat or Indian corn.	Rye and turnips.	Flax.	Clover.	Wheat or Indian corn.
FLAX, CLOVER, OR CARROTS.			Potatoes.	Wheat or Indian corn.	Rye, barley and turnips.	Oats.	Flax or carrots.	Rye.	Clover.
	Oats..	Rye, carrots, or barley & turnips.	Potatoes.	Wheat or Indian corn.	Rye and turnips.	Barley and turnips, or oats.	Flax.	Clover.	Potatoes.
	Barley and turnips.	Rye or carrots.	Potatoes.	Wheat or Indian corn.	Rye and turnips.	Flax or carrots.	Oats.	Clover.	Potatoes.

III. *Table of rotations in an ordinary sandy soil.*

First year.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.	Eighth.	Ninth.	Tenth.
			Buckwheat.	Carrots.	Potatoes.	Barley and turnips.	Indian corn or carrots.		
INDIAN CORN OR CARROTS.			Oats.	Clover.	Barley and turnips.	Potatoes.	Rye and turnips.		
	Rye and turnips..	Rye and turnips.	Potatoes, peas or carrots.	Oats or rye.	Clover.	Rye, or barley and turnips.	Oats or potatoes.	Indian corn or carrots.	Rye and turnips.
			Peas and turnips.	Buckwheat.	Potatoes.	Oats.	Indian corn or carrots.	Rye and turnips.	Peas.
INDIAN CORN.	Rye.	Clover.	Rye and turnips.	Rye and turnips.	Oats or buckwheat.	Potatoes.	Rye and turnips.	Indian corn.	Clover.
						Carrots.	Rye and turnips.		
INDIAN CORN OR CLOVER.	Clover.	Oats or peas.	Rye and turnips.	Rye and turnips.	Buckwheat, potatoes, or carrots	Barley and turnips.	Oats.	Rye and turnips.	Indian corn.
						Rye and turnips.	Rye and turnips.	Clover.	

CONDENSED CORRESPONDENCE.

Statement of J. H. Forman, *of Oak Bowery, Chambers county, Alabama.*

Our system of culture does not admit of regular rotation, but when land is cleared it is usual to plant it two years in corn and then in cotton until it exhibits exhaustion, say two or three years, and next in oats or wheat, and then one or two years in fallow, which is followed by corn, &c. But this succession is frequently modified to suit the caprice or necessity of the planter, or condition of the land. For instance, the last corn crop is omitted, and the grain sown after cotton; and more frequently the fallow is omitted and the corn, or sometimes cotton, follows the grain.

Statement of Francis Fuller, *of Winthrop, Kennebec county, Maine.*

Before the "potato rot" commenced among us, the rotation of crops most common with us was, first to break up the sward and plant with potatoes, manured with stable or barnyard dung, ploughed under with gypsum applied in the hill. The second year, the ground was planted with Indian corn, which was enriched with coarse barnyard manure, and with compost in the hill. The third year it was sown with wheat and laid down to grass, and was allowed to continue as long as it would produce a ton to the acre.

BREAD CROPS.

INDIAN CORN.

CONDENSED CORRESPONDENCE.

Statement of J. H. Forman, *of Oak Bowery, Chambers county, Alabama.*

Corn is the universal crop here for home consumption, and yields 20 bushels to the acre.

Statement of Gideon Lane, *of Killingworth, Middlesex county, Connecticut.*

Corn is raised by all our farmers to a greater or less extent. Guano is used in fertilizing the ground, generally being mixed with other manure, when applied to the hills of corn. Some farmers sow at broadcast and plough it in. The gain by using this manure is calculated to be about 5 bushels to 100 pounds.

It is thought here that the best time to plant corn is from the 1st to the 15th of May. The hills are made 4 feet apart each way, with four to five stalks in each.

I think the average yield is not more than 35 or 40 bushels to the acre, although as high as 70 or more bushels are sometimes raised by superior cultivation.

Statement of Eli Goodrich, *of Brandford, New Haven county, Connecticut.*

Our farmers raise but little more corn than they need for their own use, believing it not to be profitable. I have used guano for this crop with success; but on account of its great cost the increased yield will scarcely remunerate the farmer for the outlay. By putting about 400 pounds upon an acre I suppose from 10 to 15 bushels more of corn will be produced.

With good management corn yields in this vicinity from 100 to 125 bushels to the acre, worth $1 a bushel. Time of planting the first of May. We plant the rows 4 feet apart each way.

Statement of E. Babcock, *of Riley, McHenry county, Illinois.*

Corn may be considered as our safest and most important crop, very seldom meeting with accident or disease. In the usual way of cultivating it the yield averages about forty bushels to the acre. Those whose farms are older, and have a "tame" grass sod to turn under, often raise more than double this amount.

In keeping an account of the cost of labor, &c., in cultivating an acre of corn, I find in harvesting it costs a little less than 15 cents a bushel for raising, which is worth at the railroad 50 cents per bushel.

Statement of Amos Thompson, *of Belleville, St. Clair county, Illinois.*

I estimate 45 bushels to be the average yield of corn to the acre in this county. The usual price in the fall is 20 cents per bushel. Farmers plant from the last of April even to the first of June. The best time is about the 15th of May. When the plants are coming up a heavy harrow is passed over the ground, then a plow is run three or four times between the rows, and nothing more done till harvest.

Statement of Martin Mondy, *of Vermilion county, Illinois.*

Corn is the principal crop in this county. The White and Yellow Gourd-seed are the varieties most in favor here, as they produce more abundantly than any others. The yield per acre is from 60 to 80 bushels. Our prairie farmers usually sell their surplus corn in the shock to cattle-feeders at an average price of 38 cents a bushel. It is generally cut up in October. Those who send their corn to market find a ready sale on the Wabash and Erie canal at an average price of 38 cents per bushel, when shelled; cost of transporting to the canal 5 cents a bushel. The cost of raising and harvesting an acre of corn is about $9, leaving a profit to the farmer of $13 80, when the yield is 60 bushels.

Statement of JOSEPH C. ORTH, *of McCleary's Bluff, Wabash county, Illinois.*

Corn is much cultivated in this section, and receives more attention than any other crop. The maximum yield is from 100 to 120 bushels to the acre; the average about 40 bushels.

Statement of J. C. HACKLEBERG, *of Charlestown, Clark county, Indiana.*

Owing to the unexpected drought of the past season the corn crop here has proved almost an entire failure. The scarcity of corn in consequence is severely felt, not only by farmers and ordinary consumers of this grain, but especially by those engaged in the raising and fattening of hogs, by which most of the surplus yield is annually consumed.

Our farmers have always considered this as their surest crop, and for several years past it has proved most profitable. The most successful method of cultivation is to break up, early in the spring, clover, sward, or other pasture land that has rested two years from cultivation. If the land is of good quality a good crop can be obtained without manure. Corn does well, also, after wheat, and this is the method generally pursued in this part of the country. Stubble turned under and followed by a very dry season will materially lessen the yield of corn, but if the season should be wet the crop will do well.

The average yield in ordinary seasons is from 40 to 50 bushels to the acre. As high as 70 or 80 bushels is sometimes produced. The usual price at Louisville is from 30 to 40 cents a bushel. This yea it is 70 cents.

Statement of JOHN SPINY, *of Connersville, Fayette county, Indiana.*

The kind of soil best adapted for corn, in this region, is a warm loam; and should be sod land broken up in the spring after the grass starts, which prevents the ravages of the cut-worm. After ploughing the ground should be harrowed in the direction of the furrows, to prevent turning back the sod. Then cross harrow, and it is ready to plant.

Statement of A. B. MCKEE, *of Vincennes, Knox county, Indiana.*

Corn is one of our principal crops. Average yield 40 bushels to the acre. Market value from 20 to 50 cents a bushel.

The rotation of crops generally adopted is, first, clover, then wheat, then corn; or if rye is raised, first rye, corn next, then wheat.

Statement of WILLIAM J. PAYNE, *of Rushville, Rush county, Indiana.*

I have a method of raising corn without after-culture. I plough my ground in the fall, cover it immediately with wheat straw 8 or 10 inches thick, which becomes sufficiently decomposed by planting time, for manure, in this latitude, say the 15th of May. When ready to com-

mence planting, I take a narrow hoe, strike it through the straw into the ground, and then drop in two or three kernels of corn, which I cover to the depth of an inch with earth, and replace a part of the straw, the hills being 3 or 4 feet apart.

By this method, I make corn without any after-culture, and what is better still, on the driest ground, and in seasons with but little or no rain.

Statement of H. F. Moore, *of Big Mound, Lee county, Iowa.*

Corn is extensively cultivated here for feeding to hogs and other stock. The average yield without manure is about 40 bushels to the acre; but when well manured with stable or barnyard dung, over 100 bushels are sometimes obtained.

The average price on the farm is usually 40 cents per bushel; but this year, in consequence of the drought, it is double that price.

Statement of H. G. Stuart, *of Montrose, Lee county, Iowa.*

I have known 100 bushels of corn to be raised to the acre here; but owing to the careless manner of cultivation, I would place the average yield in Southern Iowa at 40 bushels per acre. On account of the severe drought the yield, the present season, did not exceed 22 bushels an acre. Cost of production usually about 15 cents a bushel, allowing $2 an acre for the use of the land.

Statement of Admiral B. Miller *and* Joseph Brobst, *of Knoxville, Marion county, Iowa.*

Corn is the principal crop in this State. The average yield is about 60 bushels to the acre. Present value 25 cents a bushel.

The manner of bringing our prairies into cultivation, is to break up the sod with a strong team of four or five yoke of cattle. This is generally done in June, at an expense of about $2 per acre. Corn is planted, by being dropped in the furrows after the plough, and covered by the succeeding furrow-slice. This crop is called sod corn, and commonly produces about 25 bushels to the acre. Nothing is done to the corn, after planting, until ready to harvest. This first crop will generally pay the expense of breaking up the prairie lands.

Statement of J. W. Raynolds, *of Newbern, Marion county, Iowa.*

Corn is our principal crop. It is generally cultivated in a careless manner, and very little manure is used; but such is the fertility of our prairies that very good crops are usually obtained. A great deal is raised here by simply ploughing the ground about two inches deep and droping the corn in every second or third furrow, to be covered by the next furrow-slice turned over. The plants make their way up through the sods. Another method is to plough the ground, and then, with a pointed stick, at proper distances, to make holes through the sod, into

which the grains are dropped. When the ploughing is well done, the former method is as good as the latter; otherwise, not so successful. Land cultivated in this manner, without any further labor, produces from 5 to 40 bushels to the acre; average, about 25 bushels. Pumpkins and squashes are also generally raised at the same time.

Old ground produces from 30 to 75 bushels to the acre, and sometimes as high as 100 bushels.

Statement of SAMUEL D. MARTIN, *near Pine Grove, Clarke county, Kentucky.*

Corn is our main crop, and is probably worth more than all the others cultivated here. The average yield is about 60 bushels to the acre. Some fields produce double that amount per acre. The market price is usually about 25 cents a bushel; this year 75 cents.

Statement of JOHN B. C. GAZZO, *of La Fourche parish, Louisiana.*

This crop is raised in great abundance in this parish. The best mode of cultivating is to throw the ground up into beds, in the same manner as for cotton. Plough deep and close, and plant in "water-furrow," to protect the corn from the drought. The first time, in cultivating, plough deep and close, with a long narrow plough; the second time, less deep, with a larger plough; the third time, shallow. The average product is from 40 to 50 bushels to the acre.

Statement of L. RATHBUN, *of Bellevue, Bossier parish, Louisiana.*

Indian corn is only raised in this parish for home use. It will yield from 15 to 50 bushels to the acre, the "hill lands" producing from 15 to 25 bushels, and the "river" or "bottom lands" from 40 to 50 bushels.

Statement of EDWARD F. GARLAND, *of Aroostook,* (*No.* 11, *range* 5, *Aroostook county, Maine.*

Corn is a very uncertain crop here on account of the shortness of the season. Although some years it is very good, in others the kernels do not even fill before the frosts kill it.

Statement of GILBERT L. BAILEY, *of Portland, Cumberland county, Maine.*

Early last spring I received from the Patent Office a small quantity of what was called "Improved King Philip or Brown Corn." Not being engaged in agricultural pursuits myself, I handed it to a friend, Mr. Robert Leighton, of the neighboring town of Westbrook. He planted the seed early in June, in a soil composed of a dry, sandy

loam. For convenience in tilling, he planted the hills 3 feet apart each way, four kernels to the hill. The corn was harvested the 10th of September, and yielded in good full ears at the rate of 120 bushels of shelled corn to the acre. Had it not been for the drought the yield would probably have been considerably more. Our common kinds of corn did not yield more than one half the usual crop.

I may add that a gentleman living some twenty miles in the interior took about forty kernels of the corn, which he planted after he had begun to hoe his other crop, and in two months and twenty-seven days he gathered 5 pecks of fine full ears from the product.

Statement of EUSEBIUS WESTON, *of Bloomfield, Somerset county, Maine.*

The best product in this vicinity at present is corn, although some of the smaller crops may yield a larger proportional profit. The maximum yield is about 140 bushels, but the average crop does not exceed 40 bushels to the acre. About 20 bushels will pay the expense of raising, not including the previous culture of the land, nor the cost of manure. The cheapest method of raising is to manure on the sward and plough under.

Statement of PELEG W. PECKHAM, *of Westport, Bristol county, Massachusetts.*

Last spring I received a small bag of "Improved King Philip or Brown Corn" from the Patent Office. To test this corn by comparison with the kinds I usually cultivate, I planted it at the same time, the 10th of May, and in the same way. It yielded 208 ears of a large size, although several hills were destroyed by the worms. It eared low, and was harvested twenty days before any of my other corn. I usually plant the Rhode Island White-flint and Yellow Canada corn. The seed of the latter, I obtain every fourth year direct from Canada, as it ripens later by planting seed raised here. I have heretofore considered it the earliest variety cultivated. From the above result, I think the "Brown corn" is well adapted to our soil and climate.

My usual way of cultivating corn is as follows: I spread 20 tons to the acre of mixed hog and stable manure upon sward land, then plough eight or nine inches deep, and harrow with a heavy harrow till the earth is well pulverized. The ground is then marked off with a chain into rows 3½ by 2½ feet apart. Four grains are dropped into each hill and covered two inches deep. When the corn is about three inches high, a cultivator is passed between the rows and the weeds near the plants cut up with a hand hoe. In about three weeks a small harrow is drawn between the rows and the hoe again used, always taking care to leave the ground level around the corn, and only three stalks standing in a hill. At the proper time, the stalks are cut, and when ripe the corn is cut up close to the ground, and drawn into the barn, a few loads at a time, and husked. My average crop is 50 bushels to the acre. The ordinary yield in this town is from 25 to 30 bushels to the acre.

Statement of EPHRAIM MONTAGUE, *of Belchertown, Hampshire county, Massachusetts.*

Having received from the Patent Office a sample of "Improved King Philip" or "Brown" corn, I planted it the first of June last, according to the directions given. There were seventy-two hills, at distances of 2 by 3 feet, thus occupying about two rods of ground. The land was on a pine plain, light, and rather sandy, with some coarse gravel, on which we seldom raise more than 20 or 30 bushels to the acre, with the same amount of manure as was applied in the present instance. It grew well, but was somewhat injured by the drought. I hoed it three times, and gave it a top-dressing of a spoonful of ashes and plaster to each hill, after the first hoeing. A few of the stalks were eaten off by the wire-worm. I harvested the product early in September; and the amount raised, after being well dried, was 25 quarts of corn of good quality, being equal to 62 bushels to the acre. This I consider a greater yield, on such a soil, than 100 bushels would be on some of our rich, or highly-manured lands. I believe the variety to be a valuable acquisition to this section of the country.

Statement of J. E. WATERS, *of West Millbury, Worcester county, Massachusetts.*

On the 25th of May last, I planted a small parcel of "Improved King Philip or Brown corn," received from the Patent Office, following the directions given. It was fit for harvesting twenty days earlier than any other corn in the vicinity, and was very sound and good. The yield was at the rate of 85 bushels to the acre. I think it is far superior to any early variety of corn known among us.

Statement of HENRY H. HOLT, *of Cascade, Kent county, Michigan.*

Next to wheat, corn is considered our most valuable crop. It is usually planted after wheat. The time of planting is from the 10th to the 25th of May. For the last two years, early-planted corn has been the most successful, being less affected by drought. The yield is from 20 to 50 bushels to the acre. Price from 38 to 75 cents per bushel.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

The average yield of corn, in this section, is from 30 to 40 bushels to the acre. Cost of raising, from 20 to 30 cents a bushel. Market value, 60 cents a bushel.

Statement of JAMES DOCKERAY, *of North Cannon, Kent county, Michigan.*

Last spring I received from the Patent Office a small package of "Improved King Philip or Brown corn." It came after most of my crops were planted, and consequently, I was obliged to plant it on a

rather poor piece of Timothy sod, which had been mown for five years previous. I planted it about the first of June, according to the directions. After the corn came up, I applied a top-dressing of unleached ashes, a handful to each hill, and hoed but once. The amount of ground planted was a square rod; and the product was one bushel of ears, which will undoubtedly furnish half a bushel of shelled corn, or at the rate of 80 bushels to the acre. My other crop of corn did not exceed 15 bushels to the acre.

Statement of M. W. Philips, *of Edward's Depôt, Hinds county, Mississippi.*

Most of our farmers rely upon corn, almost solely, for the sustenance both of man and beast. We have no pastures, no small grain, and very little of root crops; hence, when the corn crop is cut short, they feel the effects severely. If I could be heeded, I would advise a much greater variety of products. Plant less corn, make pastures and hay, sow small grain, and plant peas or pea-nuts, in the rows with the corn at the first ploughing. These last are excellent for fattening hogs, and furnish good provender for horses and mules. Potatoes, also, both the sweet and Irish, should be more extensively raised. I have seen two crops of "Canada" corn grow here in a season. Might not this plan of cultivation be profitable?

Statement of H. L. Brown, *of Fayette, Howard county, Missouri.*

Our soil and climate are peculiarly favorable to the production of this crop. The best method of cultivating, practised by our farmers, is to turn under a clover sod in the fall, harrow well in the spring, and lay off in rows 3½ by 4 feet apart. As soon as the corn is up, harrow; then cultivate both ways between the rows, but only one way at a time, with a plough. The ploughing is repeated at intervals of a week or ten days, four or five times.

Many persons believe it is injurious to plough often or deep between the rows of corn in dry weather; but last season, I had an opportunity to observe the good effects of ploughing. Near the close of the corn culture, I had not quite finished the last ploughing of a field of corn on Saturday night, leaving a few rows untouched. The next week, my wheat harvest commenced, and, consequently, the corn was not afterwards touched. When the severe drought came on, in August, the whole of this field was green and luxuriant, with the exception of these few rows, which could be distinguished from the rest of the crop by their yellow and feeble appearance, as far as the field could be seen. The yield of these rows was not more than one-fourth as much as that of the main field.

The maximum yield of corn, without manure, may be put at 100 bushels to the acre. The average crop is about 50 bushels to the acre. The smallest yield that will pay expenses is 20 bushels per acre.

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Statement of E. A. Philips, *of Coventry, Chenango county, New York.*

Last spring, I planted seventy-eight hills, four kernels to the hill, of the "Improved King Philip or Brown corn." The hills occupied three square rods of ground, and a handful of a mixture of hen manure, lime, and ashes in equal proportions was applied to each. The product was 121 quarts of shelled corn, equal to about 90 bushels, to the acre. This proves the variety to be well adapted to our northern climate.

Statement of N. Ormsbee, *of Ashland, Greene county, New York.*

From the Patent Office, last spring, I received a small bag of "Improved King Philip or Brown corn," which I planted according to the directions given. Its yield was at the rate of 90 bushels to the acre. think the crop fell short fully one-third on account of the drought.

Statement of W. M. Mahew, *of Marcy, Oneida county, New York.*

I received, the first of June last, a small package, containing about half a pint of "Brown corn," from the Patent Office. On the 9th of June I planted it, but thought it would never ripen. To my surprise, however, it was fully ripe by the middle of September. It was considerably injured by the drought; but notwithstanding that, the yield was 3 bushels of ears, or 1½ bushels of shelled corn.

Statement of S. Tompkins, *of Gorham, Ontario county, New York.*

Having received a parcel of "Improved King Philip" corn from the Patent Office, I planted it the 12th of May on a light sandy soil, not very rich, in rows three feet apart both ways. I hoed it twice, and applied a top-dressing of plaster at each hoeing. The corn was harvested the 25th of August and shelled the 25th of December. The yield was at the rate of 86 bushels to the acre. The season was so dry as to be unfavorable to its growth; otherwise, I think the yield would have been one-fourth more. I believe it to be an excellent variety. It is at least two weeks earlier than the common kinds planted here.

Statement of J. H. Mead, *of Galway, Saratoga county, New York.*

A sample of "Improved King Philip or Brown corn," was received, last spring, from the Patent Office. On the 15th day of May, I planted it in my garden, on about one square rod of ground. The directions given were carefully attended to. The situation proved somewhat unfavorable, being in the shade of a plum-tree; otherwise, perhaps the yield might have been greater. As it was, the corn came up quickly and grew fast, keeping ahead of any other corn in the vicinity. On the first day of September it was harvested, and yielded a little more than a bushel of ears, all good and sound. I think the variety is well adapted to this northern climate.

Statement of JOHN WHITE, *of Lisbon, St. Lawrence county, New York*

A small package of "Improved King Philip or Brown corn," was received last spring from the Patent Office. I planted it, and gathered one bushel from the crop. I would recommend its cultivation, especially because of its extreme earliness. On this account, I should consider it very desirable for early green corn.

Statement of PETER REID, *Lake Post Office, Greenwich, Washington county, New York.*

In this county are cultivated the favorite varieties of Indian corn usually grown in the Northern States. The average yield to the acre, on ordinary soil, well cultivated, is about 45 bushels.

Statement of JOSHUA HARRIS, *of Welche's Mills, Cabârras county, North Carolina.*

The present crop of corn is light on account of the drought; but "bottom lands" have yielded pretty well. I had 40 bushels to the acre the present season on such lands. We plant 4½ apart feet each way, and two stalks to the hill. The present price of corn is 75 cents per bushel.

Statement of S. S. G. FRANKLIN, *of Cuba, Clinton county, Ohio.*

Owing to the severe drought last summer, our present crop has been cut short. The average yield to the acre will probably not exceed 25 bushels, though from some good "bottom lands" 75 bushels may be gathered.

The cost of production is 10 cents a bushel. Present price at Wilmington, 56 cents, and at Cincinnati 66 cents per bushel.

We generally break up sward land in the winter, harrow it well in the spring, mark it out into squares 3½ feet each way, and cover the seed by hoes. Our time of planting is from the 1st to the 20th of May. When the corn is up, we keep the ground loose and free from weeds with the cultivator or double-shovel plough. We cut up the stalks in the fall for fodder, and sometimes sow the ground with wheat.

Statement of D. C. M. EVANS, *of Scio, Harrison county, Ohio.*

The average yield of corn to the acre in this section is about 40 bushels, although some fields exceed 100 bushels. The cost of production is about 18 cents a bushel. The price of corn is from 62½ to 80 cents.

We cultivate by breaking up sward land in the winter, and harrowing well before planting. We mark the rows out 3½ feet apart each way, and cover by hoes. When the corn is three or four weeks old, the cultivator and double-shovel plough are used to keep the ground to loose and to destroy the weeds. The crop is cut up in the fall, and the ground usually sown with wheat.

Statement of Isaac R. Evans, *of Harrisville, Butler county, Pennsylvania.*

Last season, I treated a field of corn in the following manner: The land had been in clover and other grass for three years previous. In the spring, as soon as the ground was fit to plough, I turned under the sod to the depth of eight or nine inches, and did nothing more to it till planting time, when it was thoroughly harrowed. After planting, it received a slight dressing of compost and coal ashes. The cultivator was then passed twice and the plough once over the ground. The drought was so severe that the yield was not more than half what it otherwise would have been. I harvested 40 bushels from each acre.

The two varieties most cultivated here are what are known as the "Pennsylvania White-cob" and the "Pennsylvania Red-cob." The latter is lighter in the grain, more easily shelled, and ripens a little earlier than the former, but is not so productive.

Statement of E. Shoemaker, *near Ebensburg, Cambria county, Pennsylvania.*

An early and hardy variety of Indian corn has long been a desideratum among the Alleghany mountains, where our summers are generally too short for the successful cultivation of the common kinds known to our farmers.

Towards the last of May, I planted a sample of "Brown" or "Improved King Philip corn," on rather thin, poor land, and at the same time planted, on a similar spot in every respect, an equal quantity of the best variety of corn previously cultivated in this section. To each hill of the "Brown corn," I applied a quantity of a "fertilizer" purchased in Philadelphia, which, however, proved to be worthless, as was fully ascertained by its application to other crops. To each hill of the other corn I applied a shovelful of manure. The "Improved King Philip" produced decidedly a better crop, both in quantity and quality, than the other variety, and ripened nearly or quite three weeks earlier than any other corn in this county.

Statement of George Buchanan, Samuel Gilliland, James T. Hale, David Duncan, and William P. Fisher, *being that portion of their report which relates to Indian corn, addressed to the Centre County Agricultural Society of Pennsylvania.*

The varieties of corn mostly cultivated in this county are the "Large Yellow," "Squaw," and the "White Gourd-seed," the first two having the preference, as being earliest and most reliable in product.

The preparation of our land for corn is as follows: A stiff clover or Timothy sod is selected; and if low land, it is ploughed in the fall, at least eight inches deep, but if upland, the ploughing is usually deferred till spring, and in that case, all the manure used is hauled out in the winter or early in the spring, and spread upon the land. The ploughing should not be done till the frost is entirely out of the ground; otherwise, the soil will bake and remain hard all summer. The ground is then well

harrowed, so as to be of fine tilth, and finally furrowed out, say at distances of 3 by 4 feet. The corn is planted at the intersection of these furrows. Some farmers only furrow one way, 3 feet apart, and then drop two or three grains in each hill at distances or about 20 or 22 inches. The reason assigned for this method is, that more corn can be raised on a given quantity of land than by the other mode. Corn-drills are not in use among us, and hence, we cover with the hoe. When the corn is up, we stir the ground with a light harrow, having a boy to follow and set up such plants as have been disturbed. Immediately after this, we commence with the cultivator, and continue its frequent use till the corn is too large for tilling. We believe that the thorough use of the cultivator will insure a fine crop in favorable seasons, without employing the plough, and leave the land in much better condition for the succeeding crop of wheat, than by its use. At the same time, candor compels us to say, that most of our experienced farmers prefer the plough at the last working of the ground.

Seed corn should be selected from the fairest ears, rejecting the grains on the extreme ends. Before planting, we recommend that the seed be soaked over night in a strong solution of salt and water, and then mixed with equal parts of lime, ashes, and gypsum, sufficient in quantity to enable the corn to be readily dropped. This promotes the early vegetation of the corn, and in some measure prevents the ravages of crows and worms. When the corn is well up, ashes and gypsum are thrown on each hill; and this process is repeated, or the mixture is sown broadcast over the field, at the rate of 10 or 12 quarts to the acre.

Corn is generally husked in the field, between the 15th and 25th of October, and hauled to the cribs as soon after as possible. Some farmers, also cut off the stalks entirely, and then sow the ground to wheat; but this method is followed only to a limited extent.

Corn in the ear is principally used for fattening hogs, and is considered excellent food for horses throughout the year. Corn-meal is also used for fattening cattle and hogs, and as food for horses. The past season, owing to the extreme drought, has not been favorable to a large yield of corn, but in some parts of the county an average crop has been obtained, which is estimated at from 60 to 80 bushels of ears to the acre. Shelled corn is worth, with us, from 55 to 60 cents a bushel.

Statement of James S. Montgomery, *of Eagle Lake, Colorado county, Texas.*

In reference to insects which infest grain crops, I would state that, for several years, I have tested, with complete success, a plan for preserving corn against the ravages of the weevil. It is to store the corn dry and in good condition, in air-tight cribs. My cribs are built of logs, pointed and plastered with clay, and shedded all round. I have known others to pursue the same course, and invariably with complete success. I think storing in large quantities conducive to preservation.

Statement of GEORGE C. BRIGHTMAN, *of Goliad county, Texas.*

Corn is extensively raised here. The proper time for planting it is from the 10th of February to the 1st of April. If planted after that time it is liable to be destroyed by worms and grasshoppers during the summer. The variety known as the "Gourd-seed," is the best for this climate, being the earliest and most productive. But our county is new, and only a few varieties have ever been introduced.

Peas are sown in drills, between the rows of corn, at the last dressing, and produce abundantly without further cultivation.

Statement of ZENO P. WALKER, *of Egypt, Wharton county, Texas.*

Corn is our chief grain. Our rich lands produce a plentiful crop. The average yield is 50 bushels to the acre. The weevil is its greatest enemy. Tight houses, excluding air and light, are said to prevent their ravages.

Statement of JOSEPH TASKER, *of West Rupert, Bennington county, Vermont.*

The following experiment was made last season on four acres of land, which had been in grass the four previous years. The soil is a gravelly loam. On three acres, green farmyard manure was applied, at the rate of thirty cart loads to the acre, by spreading on the ground and ploughing under. On the other acre, thirty loads of sheep and hog manure were spread and harrowed in. The corn was planted in hills three feet apart each way. The variety planted was the "Improved King Philip." Plaster was dropped in the hills, and 12 bushels of ashes applied as a top-dressing, previous to the first hoeing. A dressing of plaster was also added both after the first and second hoeings, the latter of which took place just at the commencement of the drought. I think the plaster was of vital importance in attracting the moisture from the atmosphere and thereby counteracting the effect of the drought. The acre which received the sheep and hog manure took the start of the other in the first part of the season, but at harvest there was no perceptible difference between the two portions of ground. The result was as follows:

Expense of cultivation.

Manure, 120 loads, at 50 cents a load	$60 00
Drawing on and spreading	6 00
Ploughing and harrowing	12 00
Marking out and planting	[illegible] 00
Hoeing	[illegible] 00
Ashes and plaster	5 50
Applying the ashes and plaster	2 00
Harvesting	31 25
Interest on land	24 00
	156 75

Value of crop, 388 bushels, at 75 cents a bushel..........	$291 00
Value of stalks, 12 tons, at $3 a ton	36 00
	327 00
Direct expenses as above..........................	156 75
Profit on the 4 acres.................................	170 25

Or, $42 56 an acre.

Fourteen bushels to an acre will about pay the expense of cultivation without manure.

Statement of J. B. Proctor, *of Rutland, Rutland county, Vermont.*

Last spring, I received a package of "Improved King Philip or Brown corn," from the Patent Office, and planted it the third day of June, on a square rod of ground. It was harvested the first day of September, being fully ripe. After being well dried the corn was shelled, and measured upwards of 16 quarts, or at the rate of 160 bushels to the acre. This kind of corn must prove a great acquisition to our region.

Statement of William Smoot, *of Boone Court House, Virginia.*

Corn is the most certain and profitable crop raised here. Our best lands will produce from 40 to 50 bushels to the acre. A bushel costs 12½ cents, and is worth, in the fall, from 25 to 30 cents.

Statement of Gustavus de Neveu, *of Fon du Lac, Fon du Lac county, Wisconsin.*

Indian corn, with us, has turned out very well, the last season, the average yield being not less than 40 bushels to the acre; but less was planted than usual.

Price from 44 to 50 cents per bushel.

Statement of J. W. Clarke, *of Marquette, Marquette county, Wisconsin.*

Corn is a sure crop in Northern Wisconsin, on all the varieties of soil existing here. The average yield on the prairies, is about 35 bushels to the acre; in the "openings," about 25 bushels. This difference of yield is on account of the stumps in the "openings," as they prevent the ground from being all cultivated. When the stumps shall have rotted out, the yield will probably be equal to that of the prairies, and perhaps the case will be reversed before long, since the more general cultivation of the prairies will sooner exhaust their fertility.

The corn is cultivated by running a shovel-plough or cultivator two or three times between the rows, and then using a light plough once or twice if the weeds require it. Distance between the rows and hills,

about 4 feet. The varieties cultivated are the "Yellow" and "White-dent corn.

Statement of WILLIAM ALVERSON, *of Beloit, Rock county, Wisconsin.*

Indian corn is considered our best crop. The yield is usually about 50 bushels to the acre; but I have often seen 70 and even 100 bushels raised. Time of planting, the 1st of May. Price, this year, 40 cents a bushel.

WHEAT.

DISEASES.

The following communication on the mildew and smut in wheat has principally been drawn from Baxter's "Library of Practical Agriculture," the opinions of the writer of which differ somewhat from those of many others who have written on these subjects:

The "Red Rust," "Mildew," "Blight," or "Red Gum," (*Puccinia graminis,*) first attacks the leaf and then the straw of wheat, just at the time of blooming, thus continuing until the period of maturity, and, like many other parasitical plants, destroys the vigorous growth and energy of its supporter. Some forty years ago, Sir Joseph Banks published the result of his observations, founded upon occular demonstration, that the disorder in wheat was a cryptogamous, or fungus plant, attacking the stalk, the seeds of which were wafted to and nourished by the straw. The attack generally takes place after much wet weather, between the blooming and ripening of the seed, which will open the pores of the surface of the straw, ready to admit the sporules, or fungus seeds; yet notwithstanding this information, and the accumulated observations of other vegetable physiologists, many of the cultivators of the earth will say that blight is something generated in the air, and "comes with a thick mist, and cannot be a seed."

It will well repay the agriculturist to observe with attention the progress of this disorder before the wheat comes into ear, during the blooming, the ripening, and after the harvest. It may be found throughout these periods in the districts and seasons to which it is subject, and even may be seen on the blades of young wheat in the winter. In examining this red rust with a magnifying glass, even when it becomes black and ripe on the straw, it will pay for the trouble. If the magnifier be good, and the rays of the sun are thrown on the plants, the fungus will have the appearance of a bunch of grapes. When it is in a luxurious, growing state, it appears to lift up the skin, or epidermis, of the straw, and thus injure the plant. Sir Joseph Banks observed the pod of this fugus to cast seed, which would lead us to suppose that the straw, which was much affected with this disorder, in the state of dung, would be a treacherous fertilizer, as it would again lay the foundation for another blight to come forth with the next crop of wheat as it emerges from the

ground. To obviate this, the straw should be burned, charred, or scorched with other vegetable rubbish, or be decomposed with unslaked lime.

The cause or origin of "smut" in wheat is not so easily domonstrated as that of the blight, or at least it has not been so much observed by scientific men as to give so decided a definition of its progress. The effects observed are, that "smut balls" will occur on one side only of an ear, sometimes only one or two grains will be affected. It will often occur on the side of an old dunghill, near the border of a field or fence, or by the side of a foot-path. The ears are sometimes backward in coming into bloom, the straw shorter than the rest of the wheat, deeper rooted, and often being obliged to make a double set of roots before coming out of the ground. The grain will retain the husk, or skin, in the outward form of the berry, but instead of the mucilage and starch, it contains a black powder, or smut. One fact which has constantly been observed is, "*it is never seen until after the blooming season*, neither in balls nor exposed."

One of the causes which has been given is, that it arises from the degeneracy of the grain, in continuing for too long a period in the same kind of soil. But this degeneracy of grain is as much a mystery as the degeneracy of animals, and requires a knowledge of what constitutes a fertile earth; how it be made so; what soil is the most proper; and, when these have been ascertained, the question then presents itself, Does it degenerate in its proper soil, or may not the change take place from the nature of the climate or season?

If we reason on this subject by analogy, it will be observed that no smut balls nor smutty ears are seen on the wheat before blooming. Now, it is known that with other vegetable blooms an impregnation must take place, or there will be no seed. During the blooming season of wheat, there are three stamens, or male portions, thrown out beyond the chaff, or calyx; each stamen has an anther hung by a very fine thread. These three males are designed to impregnate the one female stigma, which is situated in the centre of the anthers. From these anthers, a pollen is emitted, which adheres to the stigma, and is conveyed by it down to the seed at its base. Congenial weather is necessary to perform this delicate operation of nature, which is indispensable to the perfection of the grain. A peculiar warmth and a certain electric state of the atmosphere prepare the parts for this process, which always occur on a dry day. Should unpropituous weather destroy or injure the anthers, or by any fortuitous circumstance the organs of fructification should be prevented from performing the part which nature designed them to do, the grain then receives an injury, a false conception takes places, vitality is not given to the seed, and the spark of life is not conveyed to the germ, although the female organ may have done its part in giving the formation and the nourishment in making the mould for the grain. With this explanation, parts of the ear may be injured and not all the grain. Again, the site of a dung-hill will render the grain precocious or make monstrous growths. The sides of foot-paths and the borders of fields, too, have more casualties to run through than other parts of the field; the blossom may be injured, or the seed may have been trodden upon or buried too deep to come into

bloom at the proper season. The short straws are also backward in coming into ear, and have all the chances of bad weather to run.

Sir Humphrey Davy states, in his "Agricultural Chemistry," that the starch of grain consists of carbon 44, oxygen 50, and hydrogen 6; and that the sugar or sacharine part consists of 28 of carbon, 64 of oxygen, and 8 of hydrogen. If, then, the pollen from the male organ of the fructification is a conveyance of hydrogen to the seed, we may hazard a conjecture that it obtains its oxygen from the atmosphere, and its carbon from the root in the form of carbonic acid gas. Hence, we may conclude, that if an impregnation does not take place, the carbon only constitutes the seed and the smut ball is a bitter black carbon, a charcoal, and not a fungus, as naturalists have hitherto considered it. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of J. H. Forman, *of Oak Bowery, Chambers county, Alabama.*

Wheat, in this section, is an uncertain crop, being subject to the ravages of the fly, the rust, the smut, and late spring frosts. For the first two evils no sure remedy has ever been found. For the smut, a careful separation of the seed sown from all defective grains appears to be the only safe remedy. The practice of soaking the seed in a solution of sulphate of copper has sometimes been successful, particularly when sown on dry ground and the sowing succeeded by dry weather. The same success has attended soaking in pure water under the above circumstances; while the most careful saturation has produced no perceptible benefit when the sowing has been in wet ground or immediately followed by wet weather.

Statement of F. G. Appleton, *of San José, Santa Clara county, California.*

In February, 1852, I sowed ten acres with Chilian bald wheat, and had an average yield of 60 bushels per acre, 60 pounds to the bushel. In January to last of March, 1853, I also sowed eighty acres, and had an average yield of 47 bushels. In January to the middle of March, 1854, I again sowed one hundred and fifty acres, and had an average yield of 42 bushels. This year I have two hundred and sixty acres sown, all of which looks very well.

In the year 1853, the grain was considerably injured by rust, as was that of nearly every farmer in San José valley. Last year most of the wheat raised in California was more or less injured by smut; mine was not affected. The Australian wheat, the kind most generally raised, was, with scarce an exception, injured.

Statement of E. BABCOCK, *of Riley, McHenry county, Illinois.*

The kinds of wheat mostly cultivated here are the "Canada club," "Italian," "Hedge-row," and the "Rio Grande." The winter varieties are not generally very successful, but are declared to be as safe and profitable as any raised. Rust and winter-killing are their greatest bane. Spring wheat succeeds well, but has been blighted for two years past. One ploughing is deemed sufficient, and better than two, even on a summer fallow. No manures are used on this nor any other crop, except that from the barn-yard, which is usually spread on the corn ground.

Nearly all of our harvesting is done by machinery, the grain being secured in stacks and threshed in the field. The yield varies from 15 to 35 bushels to the acre; average about 25 bushels, valued from $1 25 to $1 30 per bushel. Cost of transportation to Chicago by railroad, 7 cents a bushel.

Statement of AMOS THOMPSON, *of Belleville, St. Clair county, Illinois.*

My mode of cultivating wheat differs somewhat from that practised in this vicinity. I sow after oats, which have been preceeded by corn. Immediately after the oat crop has been gathered, I plough the ground about five inches deep, and harrow as soon after as possible. Then, if the field will admit, I let my stock upon the ground, about a month after which I plough a second time. In this state, it remains until the last of September or first of October, which I believe is the best time for sowing the wheat, if the oat stubble is sufficiently rotted. The wheat is covered with a small plough, and nothing more is done to the ground.

Many farmers sow on corn stubble after once ploughing, and harrow in. With this method, the yield is small and uncertain. Others plough in the spring, let the ground lie fallow during the summer, and plough a second time in August. This is a better and surer mode of culture.

The average yield of my wheat for the last eight years, as ascertained by accurate measurement, has been 20⅗ bushels to the acre, never greater than 25, nor less than 17 bushels, except in one instance, when it was only 12 bushels. I believe the average yield of this county does not exceed 17 bushels to the acre.

I believe $11 will cover the cost of raising and sending to market an acre of wheat, according to my mode of culture. The average price for the last eight years in market has been 90 cents per bushel. This year, it is $1 15 a bushel. The cost of transporting flour from our mills to New Orleans is 75 cents a barrel.

Statement of MARTIN MONDY, *of Vermilion county, Illinois.*

Wheat does very well here. The variety most in favor is the "White-flint," which produces from 10 to 30 bushels to the acre. The greatest and only drawbacks to wheat we have are the rust and "freezing out." For the former, we have no remedy; against the latter, sowing on corn ground where the stalks are left standing is a good protection. We usually adopt this mode of sowing.

The price varies from 75 cents to \$1 25 per bushel. The cost of producing is about \$7 37 per acre. Profit, at average yield of 15 bushels, and \$1 per bushel, would be \$7 62 to the acre.

Statement of JOSEPH C. ORTH, *of McCleary's Bluff, Wabash county, Illinois.*

Wheat can be cultivated to the best advantage in this section. The maximum yield is about 50 bushels to the acre, the average about 20 bushels. Twelve bushels will pay expenses.

This year, wheat is worth from \$1 to \$1 10 per bushel.

Statement of J. C. HACKLEBERG, *of Charlestown, Clark county, Indiana.*

The wheat crop ranks next to corn in importance among our farmers, but it often does not succeed so well as the labor bestowed on it deserves. But with better management and preparation of the soil, it well repays the farmer for his additional labor and care. The price of wheat has varied in the last two years from 60 cents to \$1 50 a bushel. The present high price has caused an increased amount to be sown.

Statement of H. F. MOORE, *of Big Mound, Lee county, Iowa.*

Fall or winter wheat is not much raised in this locality, in consequence of winter-killing. Spring wheat is fast coming into use. We sow as early as possible after the frost is out of the ground, say by the 1st of March. We plough in the fall on corn stubble, in order to have the ground in good condition in the spring. We sow 1½ bushels of seed to the acre, harrowing it in. The yield is about 15 bushels to the acre.

The present price of wheat here is 50 cents per bushel. Cost of conveying to market, 5 cents per bushel. The variety we sow is the "Mediterranean."

Statement of H. G. STUART, *of Montrose, Lee county, Iowa.*

With careful and correct cultivation, I regard spring wheat as our most profitable crop, whenever it brings a price anywhere near what it commands this year. If the ground is fresh and ploughed in the fall, the crop is almost certain, but old ground must be manured, either from the barn-yard, by summer fallowing, or turning under clover, &c., to insure a good yield. I have had the best success by ploughing under wheat-stubble in the fall, immediately after harvesting the previous crop. I have practised this method for two years, and raised last year 25½ bushels to the acre, and this year 33 bushels. Soon after harvesting, last year, I began to plough a piece of stubble ground, but, being interrupted, did not complete it till November. The ground was all of similar quality, and in every other respect treated alike. On harvesting the crop, the early ploughed portion was found to yield more

than double the amount which the other portion produced. In fact. I do not find that there is much advantage in late fall-ploughing over spring-ploughing.

We have no regular rotation of crops, but I find that wheat will not do well after corn without summer fallowing and turning under the weeds, &c., in June.

No insect has yet troubled our spring wheat, and it is entirely free from rust. These assertions have particular reference to a variety known here as the "Wild-goose" wheat, introduced among us from Canada some eight years ago. In comparison with it, I regard all other varieties known in this section as unworthy of cultivation.

The smallest yield that will pay the expense of raising, when the price of wheat is $1 a bushel, is 8½ bushels to the acre, thus:

Rent of land	$2 00
Plowing once in August	1 00
Seed, 1½ bushels	1 50
Sowing and harrowing twice	50
Harvesting and stacking	2 25
Threshing and getting to market	1 25
	8 50

Of winter wheat, less and less is raised every year by our farmers. Our dry and cold winters nearly destroy the crop every second or third year. I have cultivated it with considerable success, having raised even 40 bushels to the acre; but the past season there was almost an entire failure because we had neither snow nor rain last winter.

The "Mediterranean" is the surest variety of winter wheat, being the only kind known here which escapes the attack of the Hessian fly. But the flour is coarse and dark-colored, and does not bring so much in market.

A great drawback to wheat-raising in the West is the changeable character of the different varieties when cultivated for a succession of years in the same kind of soil. When we get a variety which matures early, is free from rust, and hardy enough to endure our winters, it soon changes its character, or "runs out." The Mediterranean does not ripen here so soon by ten days as it did five years ago, and is, consequently, more liable to rust.

Statement of J. W. Raynolds, *of Newbern, Marion county, Iowa.*

Winter wheat, sown in September on sod land, broken up in the May or June previous, yields well here. Land ploughed as above and sown the following April with spring wheat also produces well. The only preparation necessary before sowing is to harrow thoroughly. Yield generally about 15 bushels to the acre—often much more. On old ground, spring wheat is preferable, because in our long dry winters the winds blow the earth away from the roots of winter wheat and kill it, but on sod land this does not take place, the roots of the sod protecting the wheat. To remedy the evil, some recommend sowing among standing

corn and leaving the stalks standing during the winter to protect the wheat, but the stalks are so much in the way that the method is not generally adopted.

Statement of HUGH M. THOMSON, *near Davenport, Scott county, Iowa.*

For the last two years, wheat has been the most profitable crop raised in this section. Winter wheat seems, by general consent, to be abandoned as a crop, from its frequent winter-killing; but with spring wheat, we are very successful, frequently raising over 30 bushels to the acre. The average on my farm for the last seven years is a little over 22 bushels. I think the average of the county will be about 16½. Ten bushels would pay expenses.

I consider the best mode of cultivating spring wheat to be, a deep and thorough ploughing of the ground in the latter part of August or first of September, and letting it lie during winter. I prepare the seed by a thorough separation of all foreign substances, particularly the seeds of other plants, washing it in a strong brine, and drying with newly-slaked lime; then sowing evenly 1½ bushels, if the land is clean, if foul, 2 bushels to the acre, covering thoroughly, so as to protect it from birds and the heat of the sun, at the uniform depth of two inches. I sow as early as the ground can be got sufficiently dry, and the frost out, so that if it should rain, the water would be permitted to sink away from the roots of the young plants.

Statement of J. H. STARKS, *of Burton, Marshall county, Kentucky.*

The yield of wheat in this vicinity is from 10 to 15 bushels to the acre. Uusual price 50 cents per bushel. It succeeds best after tobacco. Amount of seed sown to an acre, from 1 to 1½ bushels. Time of sowing, from the first of September to the last of October. We harvest in July.

Statement of EDWARD F. GARLAND, *of Aroostook,* (*No.* 11, *range* 5,) *Aroostook county, Maine.*

Wheat is cultivated here, and is considered a profitable crop on burnt land. Although the county is newly settled, the people begin to plough, but wheat does not do so well as on burnt land, on account of the Hessian fly, weevil, and rust, which have almost destroyed the crop in some places. We commence sowing about the middle of May, and harvest the last of August or first of September. We sow about 1¼ bushels to the acre on burnt land, and 2 bushels on ploughed land. The average yield is about 12 bushels to 1 bushel of seed. Usual price of wheat, $1 50 a bushel. No winter wheat is cultivated.

Statement of EUSEBIUS WESTON, *of Bloomfield, Somerset county, Maine.*

Wheat has been almost entirely neglected for some years past on account of the weevil, no remedy for which has ever been found here.

But it is again assuming a place in the fields of our farmers with fair success. The difficulty in raising wheat has not been altogether on account of the ravages of the weevil and Hessian fly. For, where neither was found, the straw would be imperfect, brittle, and turn black, and the kernel small, shrivelled, and make inferior flour. The same has been the case with oats and rye. It was first observed soon after threshing machines were introduced.

Statement of HENRY H. HOLT, *of Cascade, Kent county, Michigan.*

Wheat is the most important crop cultivated in this county, and is usually of a fine quality. Its cultivation is increasing, as it is now considered our most certain as well as most profitable crop. For the last two years, it came to maturity before the severe droughts commenced, while other crops were more or less injured thereby. The "Soule White-flint" variety is mostly cultivated, as it generally yields better crops than any other.

A large portion of the land in this county is "oak openings," and much of it new. Consequently, farmers do not see the need of manuring it, therefore, very little manure is used. In preparing for the first crop, which is usually wheat, the timber is "girdled," the fallen trees cut and burned, and the land "broken up" in June. It remains thus until a short time before sowing, when it is worked with a heavy harrow, which loosens the roots, which are cut off by the plough. The loose roots are then collected and burned. The "breaking up" requires a strong team and plough, and costs from $4 to $5 an acre. The first crop of wheat usually pays the expense of "breaking up," sowing the grain, and building the fence.

The timber lands here usually produce the largest crops of wheat, but the "oak openings" are considered the most certain. The yield is from 15 to 30 bushels to the acre; average, 20 bushels. The time of sowing is from the 10th of September to the 1st of October. Wheat sown before the 20th of September has been more or less injured by the Hessian fly, especially the present season. The best time is between the 18th and 25th of September. The quantity of seed usually sown to the acre is about 1½ bushels. The weevil has never been known here. The usual price of wheat, for a number of years past, has been from 63 cents to $1 per bushel; this year, it has been from $1 25 to $1 40 a bushel.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

The usual yield of wheat in this region is from 20 to 25 bushels to the acre. Cost of raising, about 50 cents a bushel. Market value, $1 50 a bushel.

Statement of J. D. YERKES, *of Northville, Wayne county, Michigan.*

The crop of wheat in this vicinity fell considerably short of the average, the present season, in consequence of excessive freezing and

exposure last winter. But in the western and northern parts of the State the crop was good. The "Blue-stem" variety is generally preferred here, not only because it is less liable to rust, and yields better than any other, but because it makes more and whiter flour.

In preparing the ground for wheat, some farmers pursue the old method of summer fallowing, by ploughing 8 or 9 inches deep in May or June, using the harrow or cultivator to pulverize the soil and keep down the weeds, and cross-ploughing just before sowing. Another method is to break up clover land in the fall, or early in the spring, plant to corn, and in the following fall sow to wheat. The next spring it is again seeded to clover, for the two succeeding years, and then planted to corn as before. By this system, more grain can be raised at less expense than by the old method, and, at the same time, the ground kept in a higher state of fertility.

The time of seeding with us is from the 5th to the 25th of September. Harvesting usually commences from the 5th to the 10th of July. Wheat is now selling at this place for $1 65 a bushel.

Statement of SAMUEL J. FLETCHER, *of Winchester, Clark county, Missouri.*

My wheat crop of 50 acres, this year, averaged 20 bushels of prime grain to the acre; while, on the same quality of land around me, the hogs were turned into most of the wheat fields, the grain not being worth cutting. I plough deep, put 2 bushels of seed on an acre, harrow thoroughly, and finish with a two-horse roller. Wheat should also be rolled in the spring, when the ground is dry. On stiff lands, harrowing in the spring before using the roller, I have found, increases the yield one-third in quantity, and improves the quality. My crop has not failed for fourteen years.

Last year, I got three varieties of wheat from Baltimore, namely: the "Australian," "Gale's Early Flint," and "White Blue-stem." The first mentioned all died; the second filled well till it reached the milky state; it then shrivelled, and at cutting-time was worthless. The "White Blue-stem" filled and yielded well, 2 bushels of seed producing 38½ bushels, the whole of which I have sown the present year; and the young crop looks remarkably fine. I think this variety will suit our prairies.

Statement of JOSHUA HARRIS, *of Welche's Mills, Cabarras county, North Carolina.*

The crop of wheat in this region has been not more than half the ordinary yield. The "Troy" wheat, which I spoke of in the last year's report, yielded well, but does not make good flour, even in the best mills. Most of our farmers sow the "May" wheat, as it succeeds best of any variety among us. It can be sown any time in November, and yields well.

Wheat is harvested from the 1st to the 10th of June. A bushel weighs about 64 pounds. The present price is from $1 25 to $1 50 per bushel. The price of flour, at our nearest railroad market, is $8 50 per barrel.

Statement of S. S. G. Franklin, *of Cuba, Clinton county, Ohio.*

Wheat is our principal crop. The average yield in this county, the present year, could not have been more than 10 bushels to the acre. This will hardly pay expenses. Present price at our nearest market, $1 40 per bushel. The "Mediterranean" and "Rock" wheats are considered the best varieties.

Statement of D. C. M. Evans, *of Scio, Harrison county, Ohio.*

The usual product of wheat in this region is from 12 to 20 bushels to the acre, although as many as 33 bushels are often raised. The time of sowing is between the 1st and 25th of September. Some sow still later. The harvest commences the first week in July, and continues about three weeks. The quantity of seed sown to the acre is from 1 to 2 bushels, generally 1½ bushels. The varieties which have proved most successful are "Soule's Garden," "White-velvet," and "White Blue-stem." Price $1 62½ to $2 per bushel.

Statement of Elias Green, *of Wakeman, Huron county, Ohio.*

But little wheat is raised here, not much more than enough for home consumption. What we have principally to guard against is winter-killing. This can be prevented in a measure by ploughing up the ground into narrow lands, or ridges, of about 12 feet in width, and making cross-drains of sufficient depth to let off the surface water.

The "White Blue-stem" is now the most popular wheat with us. The "Mississippi" variety is earlier, and on that account preferred by many.

The general yield is about 20 bushels to the acre, at an average cost of from 40 to 60 cents a bushel, according to the skill or thoroughness practised in its cultivation. The surest and most common mode of cultivation is to summer fallow the ground, and sow 1½ bushels to the acre from the 1st to the 20th of September.

Statement of Thomas F. Hicks, *of Jelloway, Knox county, Ohio.*

Wheat is the staple crop of this county, all others being subsidiary. It generally follows corn or clover. If corn, the soil should be ploughed deep, harrowed lightly, the seed sown broadcast, and brushed or harrowed in or drill-planted. If clover, and too tall or weedy to be turned under properly with once ploughing, it should be broken up, in May or June, and re-ploughed in the fall; or stirred once or twice through the summer with the harrow, to prevent the weeds from starting. It should then be stirred again thoroughly at sowing time with the cultivator, and the seed sown at the rate of 1¼ bushels to the acre.

There was more wheat sown in this county in the fall of 1853 than there had been for some time before; and there was every prospect of an abundance until within three or four weeks of harvest time, when it was

discovered, to the consternation of all, that the red weevil, or wheat midge, was destroying it. A few weevils made their appearance years ago, but not enough to do much injury; but now the little pests have come with force sufficient to take, in many cases, nearly the whole crop. There was not a quarter so much sown this fall as last; and, if the weevil still continues its exterminating war, it is probable that the culture of wheat will be abandoned entirely, for a few years at least, but it is hoped that a remedy will be found. It has been observed that wheat sown very early ripened before the weevil commenced its ravages, and conversely, wheat sown very late did not mature till they had ceased their destructive work. From this, we might infer that by sowing either very early or very late the wheat might escape their depredations, and secure a crop.

Every means should be used to force the early sowing rapidly to maturity, by scattering a small quantity of gypsum over the field.

The varieties most extensively cultivated and universally approved here are the "White Blue-stem," and "Golden-strawed." The "Mediterranean" has been very little cultivated, in consequence of its coarseness and the darkness of its flour; but it was not so much injured by the midge as the other sorts, and it will probably be preferred hereafter on account of its hardihood. The "Golden-strawed" is a few days the earliest, presents a beautiful appearance, and has a plump grain.

Wheat has been worth, since harvest, from $1 50 to $2 per bushel. The "Blue-stem" is worth 2 or 3 cents more a bushel than the other sorts. The usual time of harvesting is from the 1st to the 15th of July. A few reapers are used, but the major part of the wheat is cut with the cradle, bound in sheaves, and set up twelve to a shock.

The cost of producing an acre of wheat, including the rent or value of the land for one year, may be estimated as follows:

Ploughing once	$1 00
Harrowing three times	70
Cradling, shocking, and housing	2 00
Threshing 20 bushels, at 7 cents per bushel	1 14
Conveyance to market	1 00
Seed-wheat, 1¼ bushels, at $1	1 25
Interest on land for one year	2 00
	9 09
Twenty bushels of wheat in market, at $1	20 00
Value of the straw	1 00
Total value of the crop	21 00
Cost of culture as above	9 09
Profit per acre	11 91

Ten bushels to the acre will pay for production at the present prices; but the permanency of a good price cannot be depended upon; four years ago it was but 50 cents

Statement of C. Jacobs, *of Dayton, Yam Hill county, Oregon.*

Wheat is the only crop on which we can safely rely. With proper cultivation, we may generally expect a yield of 20 bushels to the acre.

The best mode of cultivating is, to fallow in summer, ploughing twice, and just before sowing plough a third time, and harrow in the seed. The cost of cultivating and harvesting is about $15 an acre, which, deducted from the value of the crop, say $20, leaves $5 profit to the acre.

Statement of George Buchanan, Samuel Gilliland, James T. Hale, David Duncan, *and* William P. Fisher, *being that portion of their report which relates to the cultivation of wheat, addressed to the Centre County Agricultural Society of Pennsylvania.*

The mode of raising wheat here is to turn under either clover sod or a field that has been in corn the year before; corn-field is preferred. Manure is put on in the spring in an unfermented state before ploughing for corn. This dressing answers well both for the corn crop and wheat that is to follow it. The ground is harrowed once or twice during the summer, then stirred after harvest, and sometimes harrowed again. Seeding commences the first of September, 1½ bushels being sown to the acre. It is either harrowed, cultivated, or drilled in. Clover seed is sown in March or April. Harvest commences from the 1st to the 10th of July. Our soil can be put and kept in a high state of cultivation, with deep ploughing, proper management of barn-yard manure, red clover and gypsum, so as to be made, on an average, to produce 30 bushels to the acre, without the aid of guano or any artificial fertilizers. With our present mode of farming, the yield is perhaps not over 16 or 20 bushels to the acre, in average seasons. Our farms are entirely too large, and too much stock kept on them.

The "White Blue-stem" variety is principally sown. It is fast deteriorating, and must be replaced by some other kind. "Australian," "Mediterranean," and "Golden-stem" are also sown. Our crops this year fall below 10 bushels to the acre.

Our soil is strictly a limestone clay, equal, if not superior, to any other in the State for wheat. The district comprising the valley of the Susquehanna, in the counties of Centre, Union, Clinton, and a part of Blair, and Huntingdon, 70 miles in length by 12 to 20 in width, has the elements of wealth, both mineral and agricultural, as profusely scattered as any other portions of the State; and had we better facilities of getting to market, this region would be second to none. At present, our surplus products have to be transported in wagons, over mountains, from 20 to 30 miles to get to a railroad. The average annual amount of surplus wheat in this valley is over 1,000,000 bushels.

Statement of William Smoot, *of Boone Court House, Virginia.*

Wheat should be sown by the last of August or first of September in this region. By early sowing it escapes the rust.

Statement of Gustavus de Neveu, *of Fon du Lac, Fon du Lac county, Wisconsin.*

Wheat is the principal article raised in this section for export; other grains will hardly bear transportation to the Eastern markets. The cost of hauling to the lake varies from 20 to 25 cents per 100 pounds. The average price has been, at this place, for winter wheat, $1 02; for spring wheat, 93 cents per bushel.

The "Canada Club" variety, which is generally regarded among our farmers as the most profitable spring wheat, considering the ease of raising it, brings, together with the "Rio Grande," the highest market price. It was brought to the United States from Canada, where it formerly was extensively cultivated; but not so much now on account of the terrible ravages of the weevil. It was introduced into Canada from France, where it is, at this day, the kind most raised. This wheat is vulgarly known in that country by the name of "Petit blé de mars blanc," (small March white wheat,) all kinds of spring wheat being generally designated as "blé de mars," as March is the month in which it is usually sown.

The "Canada Club" is a bald wheat, grows remarkably even and straight. The straw is uncommonly stiff, and its height rather below medium, for which reasons it is less liable to be laid low by the winds and storms than any kind of spring wheat with which I am acquainted, a quality of great value to farmers. The flour made from it is not very fine, but good; and the quality heavy. With us, it weighs generally more than 60 pounds to the bushel, and sometimes as high as 65 pounds. It will bear to be sown on richer land than the "Rio Grande." A farmer near me raised 37 bushels to the acre the past summer.

The "Rio Grande"* wheat was introduced among us more recently than the "Canada Club." It grows very tall, having the ears furnished with long beards, and altogether, when standing in the field, it strongly resembles the "Black Sea" variety, only the straw is somewhat larger, if not longer. With a favorable season, if sown on rich soil, it is very apt to lodge, and, consequently, difficult to harvest. It yields well, nearly as much to the acre as the "Canada Club," than which, in my opinion, it is less deserving of general cultivation; but as a greatly redeeming quality, it makes very fine flour, superior to that obtained from the last-named variety. It has been known to weigh as high as 65 or 66 pounds to the bushel.

The usual quantity sown to the acre is 1½ bushels, few farmers sowing less, while some go as high as 2 bushels. I would remark that the practice which has, of late, become so general, of threshing all the grain on our farms by machines, is decidedly bad for seed-wheat. Many of the grains are cracked, broken, or have their vitality destroyed by that operation. I would advise farmers to have their seed-wheat threshed with the flail, which does not injure it. I have no doubt that fully an eighth part of the grain threshed by machinery is made valueless for seed.

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* Brought into Illinois by an Englishman, a soldier in the Mexican war, who carried from the banks of the Rio Grande a handful in his knapsack, and sowed it in his garden, from which my seed was derived.

Encouraged by the high prices of wheat last year, our farmers have sown a much larger breadth than usual, say a quarter more. The average product has been about the same as last year, probably about 18 bushels to the acre.

Statement of J. W. Clarke, *of Marquette, Marquette county, Wisconsin.*

Our prairie lands rest on limestone and have a subsoil rich in lime. This section is consequently well adapted to raising wheat. But the fertility of the soil produces a rank growth of straw, which, on account of the small proportion of sand in the soil, is wanting in strength, and hence is liable to lodge. This is especially the case with spring wheat. Winter wheat, if well cultivated, is almost a sure crop in the "openings."

The average yield of spring wheat is about 20 bushels to the acre; of winter wheat, from 20 to 25 bushels.

Statement of William Alverson, *of Beloit, Rock county, Wisconsin.*

Winter wheat is a good crop in this county. It is mostly sown on new ground or summer fallow. We plough once on new ground, and twice on old, Time of sowing, from the 1st to the 20th of September. Amount of seed to the acre, 2 bushels; yield, about 25 bushels to the acre, and yearly increasing. "Blue-stem" and "Canada Flint" are the best varieties.

Spring wheat is also extensively cultivated here. Time of sowing, about the first of April. Quantity of seed sown, 2 bushels to the acre. Average yield, 18 bushels to the acre. The varieties mostly cultivated are the "Black Sea" and "Canada Club." The average price of wheat at Beloit is $1 a bushel.

RYE.

CONDENSED CORRESPONDENCE.

Statement of W. B. West, *of Stockton, San Joaquin county, California.*

The year before last, from eight grains of "Gigantic rye," I raised 2 pounds of seed, from which the past season I obtained 246 pounds of grain. Many of the heads were a foot in length, and the straw about five feet in height, remarkably sweet, and much relished by animals. The grain was more than double the original size, flinty in its character, light-colored, and resembling flint-wheat, except in length, being shaped like common rye.

Statement of Gideon Lane, *of Killingworth, Middlesex county, Connecticut.*

Rye is here considered a good crop, and particular attention is devoted to its culture. It is sown about the first of September, unless

upon ground planted to potatoes, and then as soon as the crop is dug. Average yield about 25 bushels to the acre. A crop of 40 bushels can be obtained by manuring the ground well with guano, white fish, or bone-dust.

Statement of ELI GOODRICH, *of Branford, New Haven county, Connecticut.*

The cultivation of rye is on the increase in this section. Time of sowing, September, the earlier in the month the better. Quantity of seed sown to the acre from a bushel to a bushel and a half. Yield from 10 to 50 bushels to an acre.

Statement of A. B. MCKEE, *of Vincennes, Knox county, Indiana.*

Rye is one of our staple crops. It is also considerably used as a fertilizer by ploughing it under the green. But clover is more extensively employed for this purpose. Either, when properly managed, will increase the crop from 50 to 100 per cent. Average yield, about 20 bushels to the acre. Value from 40 to 70 cents a bushel.

Statement of EDWARD F. GARLAND, *of Aroostook, (No.* 11, *range* 5,) *Aroostook county, Maine.*

Rye is considered by some farmers a profitable crop. The average yield is about 15 bushels from a bushel sown, the amount of seed generally put upon an acre. The average price is $1 25 a bushel. The "Multicaule" rye has been sown here with good success. In one instance the yield was 17½ bushels from half a bushel of seed.

A mixed crop of rye and oats is extensively raised here for making pork and beef, and for provender to supply the lumbering teams during the winter.

BARLEY.

CONDENSED CORRESPONDENCE.

Statement of EDWARD F. GARLAND, *of Aroostook, (No.* 11, *range* 5,) *Aroostook county, Maine.*

But little barley has been cultivated here till within the last few years. It is used for domestic purposes and fattening swine. We sow in May or June. Quantity of seed sown to the acre, 3 or 4 bushels. Yield, about 25 bushels per acre. Average price, about $1 a bushel.

Statement of J. D. Yerkes, *of Northville, Wayne county, Michigan.*

Barley is not raised to much extent in this vicinity. It requires strong, rich land and thorough cultivation. Three bushels of seed are sown to the acre. The average yield of the last crop was about 35 bushels to an acre. Price at the nearest market, $2 per 100 pounds.

OATS.

CONDENSED CORRESPONDENCE.

Statement of E. Babcock, *of Riley, McHenry county, Illinois.*

Oats, with us, are raised on almost any kind of land. Ploughing once to a depth of six or seven inches is sufficient. Yield, from 50 to 90 bushels to the acre, which are worth 22 cents per bushel.

Statement of H. F. Moore, *of Big Mound, Lee county, Iowa.*

Oats, in this section, are considerably raised. I usually sow two bushels to the acre. Four horses and two men will cut 12 acres in a day, at a cost of 50 cents an acre. Average yield, 55 bushels. Price, 18 cents per bushel.

Statement of Edward F. Garland, *of Aroostook, (No.* 11, *range* 5,) *Aroostook county, Maine.*

Oats are raised here in large quantities, and are considered profitable. The quantity of seed sown is from 2½ to 3 bushels to the acre. The average yield is 50 bushels per acre. They sell readily at 63 cents for 30 pounds, the legal bushel for oats in this State.

Statement of C. F. Mallory, *of Romeo, Macomb county, Michigan.*

Oats yield from 30 to 40 bushels to the acre. The cost of raising is from 12½ to 15 cents a bushel. Value, from 31 to 37½ cents a bushel.

Statement of J. D. Yerkes, *of Northville, Wayne county, Michigan.*

We consider oats an uncertain crop, and exhausting to the soil. They are sown on ground planted to corn or potatoes the year previous, at the rate of about three bushels to the acre, as early in the spring as the ground will admit. The yield in this vicinity, this year, was a good one, averaging about 40 bushels to the acre. Present price 38 cents a bushel.

Statement of Solyman G. Hamlin, *of West Glenville, Schenectady county, New York.*

Oats are extensively grown in this section, and are considered an important crop, as they command a ready sale at fair prices. The varieties mostly cultivated are the common "White," the "Black," and the "Side" or "Mane" oats. The first named are the most cultivated, as they are less liable to lodge.

From my experience, I think oats should be sown as early in spring as the state of the ground will admit, in consequence of which they are less liable to be attacked with the rust, or be affected by drought. The quantity of seed sown is from 2½ to 3 bushels to the acre. They ripen between the middle of July and first of August. The yield, under good culture and on rich land, varies from 40 to 60 bushels to the acre. Average price from 40 to 50 cents per bushel.

Oats are extensively used as feed for horses with us, and I consider two bushels worth about 2 of corn.

Statement of S. S. G. Franklin, *of Cuba, Clinton county, Ohio.*

A large quantity of oats was raised in this county the present season. The greatest yield is 75 bushels to the acre; average yield 40 bushels. The present market price is 30 cents a bushel. Cost of production 15 cents per bushel.

Statement of D. C. M. Evans, *of Scio, Harrison county, Ohio.*

Great quantities of oats are raised here. We sow from 2 to 2½ bushels to the acre. Yield from 30 to 50 bushels.

Statement of William Alverson, *of Beloit, Rock county, Wisconsin.*

Oats grow well here. Yield from 40 to 80 bushels to the acre. Quantity of seed sown 3 bushels to an acre. Price 25 cents a bushel.

Statement of J. W. Clarke, *of Marquette, Marquette county, Wisconsin.*

Oats do well here and are much cultivated, being in great demand for the northern part of the State. The yield is sometimes as high as 70 bushels to the acre. Average yield on the prairies 45 bushels; in the "openings" 35 bushels to an acre.

BUCKWHEAT.

CONDENSED CORRESPONDENCE.

Statement of Solyman G. Hamlin, *of West Glenville, Schenectady county New York.*

Buckwheat is somewhat extensively cultivated with us, and is a valuable crop, as it is much consumed as a substitute for wheat. Many farmers imagine that this crop is a great poisoner and exhauster to the land, but I do not, as I have grown it for years in succession on the same field with as good results the last as the first; and I think it is equal, if not superior, to any other crop for purifying the land from foul weeds. One bushel per acre is the usual quantity of seed used, which is generally sown the last of June or first of July. It is harvested in the latter part of September. Thirty bushels is the average yield to the acre. The price per bushel this season varies from 75 cents to $1. Fifty cents is the usual price.

Statement of Thomas F. Hicks, *of Jelloway, Knox county, Ohio.*

Buckwheat is generally cultivated here, and is a great favorite with many as an article of diet. Little or no manure is required in its culture. It is sown about the middle of June, and harvested before the coming of the frost in October. It is worth $1 per bushel.

RICE.

BY R. F. W. ALSTON, NEAR GEORGETOWN, SOUTH CAROLINA.

Rice, for which we are indebted to the island of Madagascar, was introduced into Carolina and America towards the close of the seventeenth century. A few grains were sown in the garden of Landgrave Smith, the site of which is now entirely covered by houses and modern improvements, in the city of Charleston. Those few grains produced many ears, which being disseminated for seed, succeeded in adaptation to the climate and the low country of South Carolina, at present the centre of the rice-growing region. The first seed was white, such as is grown in China and Guinea to this day, and such as may still be seen produced on the uplands and islands of America.

Some time before the Revolutionary war, the "Gold-seeded" rice was introduced, which, owing to its superiority, soon entirely superseded the white. It is now the rice of commerce, and the only grain referred to herein, where rice is mentioned, without being distinguished by some peculiar name or characteristic.

This "Gold-seeded" rice has undergone improvement in latter years. Hence has resulted the production of a variety longer in the grain, but not perceptibly larger otherwise, which is highly esteemed by foreign consumers, when it is productive, commanding the highest prices in market. It is called "Long-grained" rice. This peculiar grain, so eagerly sought out in the market, at any price, when strictly prime, and so trying to the planter's skill, perseverance, and judgment, to produce in perfection, was obtained from the sowing of part of a single head on the plantation of the late Col. Joshua J. Ward, of Waccamaw. Its appearance has only been accounted for thus: one of his friends, a planter on the Pee Dee, having a large body of forest land, had been in the habit of clearing a small portion every year or two, since 1828. He spared no pains nor expense in getting the best seed to sow in this clearing; and for ten or twelve years after, the best seed of the last product, specially culled, was with diligent care selected for the newest field. The result of this judicious and consistent attention was the appearance, in market, of seed-rice, which became notorious for its purity and soundness.

Some years ago, Colonel Ward supplied his plantation with the seed of this Pee Dee plant. The winter after, while threshing out the crop produced from it, his overseer, Mr. Thompson, called his attention to a few grains of uncommon length, being a fraction of a broken head, which he picked up in the barn-yard, directing it to be carefully preserved, he had it sown in the spring, and nursed under the immediate inspection of the overseer. From these few grains, reproduced and replanted, year by year, and preserved through the many difficulties and disasters of several years, is derived the fancy "Long-grained" rice.

The "White" rice of the present day measures three-eighths of an inch in length, the same in circumference around its shorter axis, the grain being in shape an irregular elipsoid, and in weight, numbers nine hundred and sixty grains to the ounce (troy.) The Gold-seeded rice of commerce measures three-eighths of an inch in length, the same in circumference, and in weight, numbers eight hundred and ninety-six grains to the ounce. The Long-grained rice measures five-twelfths of an inch in length, three-eighths of an inch in circumference, and in weight, numbers eight hundred and forty grains to the ounce.

Cultivation.—The system of culture for one, is suitable for any of these varieties. The first, it is said, will bear upland culture better. The last (Long-grained) it is supposed, will bear water better. It does not tiller so much, shoots up a taller stock, and longer head, but does not bear so many grains to the head as the other, and more commonly approved kind of Gold-seeded.

We begin the preparation for a new crop by cleaning out the ditches every third year; the drains are cleaned out every year, after ploughing, which is done as soon after harvest as the fields can be gleaned, and the scattered rice left on the surface to be sprouted. The stubble is turned under by running a deep furrow, say eight inches deep. Both ploughing and harrowing are performed, ordinarily, by oxen, two yoke being required if we go deeper than six to eight inches; and two yoke get on badly in the swamp. The Tuscany breed furnishes the best oxen for our climate. This may be continued until the end of

January. The sods should have the benefit of the entire winter frosts, if possible, the influence of which disintegrates and prepares them duly for levelling.

In March, or when about preparing to plant, the harrows will be made to pass over the ploughed ground. The hoe follows, to cut up and break the remaining clods and level the surface. The more the soil is comminuted and the surface brought to a common level the better. The trenchers then come in with hoes made for the purpose, and trace out with great accuracy the drills in which to sow the seed from 12 to 14 inches apart from center to center. They will average (some drawing stake-rows and others filling up the pannels) three-quarters of an acre to the hand in a day's work. When the land is new, the trench should be broad, say five inches, and the rice may be scattered in the trench; but for old land, and most of rice land is now old, narrow-trenching hoes are preferred, opening a drill three inches wide. Infected with grass-seed and volunteer rice, old land requires close hoeing, and every seed which vegetates outside the drill is cut up and destroyed.

The field now in high tilth, and resembling somewhat a garden spot, is ready for the seed. The sowers, with great care, yet with wonderful facility and precision, string the seed in the drills, putting two and a half or two and a quarter bushels to the acre. The labor of sowing depends much upon the state of the weather; whether windy or moist, or otherwise, it is better not to require any given task. Generally, each woman will accomplish two to three tasks,* and do it well. It should never be done otherwise; for the seed cannot be re-covered, if too thick, nor if too thin, can the sowing be repeated without needless waste and increased irregularity.

The best hands are chosen to sow rice. In fine April weather, it is pleasing to behold the steady, graceful progress of a good sower. The sowing done, water is forthwith admitted, (two tides are better than one,) and the field remains covered until the sprout becomes green and begins to fork. The water must then be withdrawn, else the plants will be forced to the surface by any slight agitation, and float away from their position.

In twenty days after, or thereabouts, the rice is hoed and flowed deep, the water over-topping the plant for two or three days, in order to destroy the young grass just springing up among the plants, and also the insects that may have lodged upon the blades, or which may have been generated among the stumps, roots, or stubble. At the end of two or three days, the water is slacked down to about half the height of the plant, now somewhat stretched. At this depth, it is held until the plants grow strong enough to stand erect, and will admit the laborers to walk between the trenches and pull out the long grass which shows itself, and which will now yield to very slight effort. If any rushes appear, they may now be plucked up by the root and borne out to the banks.

Two days after this weeding, the "long" water will gradually be drawn

* The "task," in the rice region of South Carolina, is (150 by 150 feet) a half acre. This is the unit of land measurement among the negroes, and with practical planters. The acre, which is a rectangle (300 by 150 feet) made by two square half acres, contains 45,000 square feet. The English or statute acre contains only 43,500 square feet.

off. A succeeding tide will be taken in and let off immediately, in order to wash out the ditches. Two men, furnished each with a long-handled rake with curved iron teeth, are put to clear from the ditches all the water-growth which impedes the draining, placing it on the side of the bank. In eight days, (the land by that time should be dry,) the smaller hoes are used, and the soil is stirred as deep as it can be with them. The plant just recovering from the effects of "long" water, and taking a dry growth, is putting forth new green blades and fresh roots, which, not long enough yet to be interfered with by the deep hoeing, very soon yield to the grateful influence of the air admitted, shoot vigorously into the loosened earth, and nourish a "good stalk."

In the course of fifteen or eighteen days, the field is hoed again and weeded. This last hoeing is also done with the small hoes, but very lightly, to avoid disturbing the roots, which are now extended nearly mid-way between the trenches.

As the plant is now beginning to joint, the laborers will step about with care, for if one be broken at the joint, it cannot be restored. A day or two after this third hoeing, the water is let on again, as deep as the last long flow, and is gradually increased in depth after the rice-heads have fairly shot out.

This is called the "lay-by" flow. Some planters have this flow very shallow, insisting that a deep flow breeds worms, to the injury of the plant before it has shot out, in which case the only remedy is to dry. Up to the time of this flow is about ninety days for rice sown the first week in April. After this, to the period of maturity, is from sixty to seventy days, during which the water is often changed and kept fresh, but is never entirely withdrawn until the grain be ripe for the harvest. Meantime, should any grass have escaped the previous hoeings and weedings, it will show its crest before the rice matures, and should be plucked up by the roots. All white rice is stripped off by hand.

Harvesting.—And now the grain is ripe for the sickle. The time for harvest is come. Gladsome, bounteous harvest! A season, it is true, of laborious exertion, but a season also of cheerful emulation, of rustic, joyous festivity. The rice is cut a day before you will say it is full ripe* The water is drawn off over night. Soon after the rising of a bright autumn sun, the reapers are seen amid the thick-hanging grain, shoulder high, clipping it down with the old-fashioned sickle, dealing brisk and dexterous but noiseless strokes. Before the dew is all gone the rice is laid prostrate, even and orderly, across the porous stubble.

The next day, when quite dry of dew, it is tied up in sheaves, and borne away to the threshing yard, where it is well stacked before the night dew falls heavy. This last heavy but gleeful labor completes the field-culture of the rice plant.

When the stack has undergone its curing heat, and become cool again, the rice is threshed out and sent to the pounding-mill to be cleaned. The mill performs ingeniously enough the finishing process, thus: by steam-power the rough rice is taken out of the vessel which freights it up to the attic of the building; thence through the sand-

* For rice sown the 1st of April, the harvest begins usually from the 1st to the 10th of September.

screen, to a pair of (five-foot wide) heavy stones, which grind off the husk; thence into large wooden mortars, in which it is pounded by large iron-shod pestles (weighing 250 to 350 pounds) for the space of some two hours.

The rice, now pounded, is once more elevated into the attic, whence it descends through a rolling-screen, to separate whole grains from the broken, and flour from both, and also through wind-fans, to a vertical brushing-screen, revolving rapidly, which polishes the flinty grain, and delivers it, fully prepared, into the barrel, or tierce, which is to convey it to market.

The barrel is made by coopers attached to the mill; each one dresses his stuff and makes three barrels a day. He is paid 25 cents for each barrel made over his number. When the stuff is dressed previously, five barrels and even more may be made.

The profits of a rice plantation of good size and locality are about 8 per cent. per annum, independent of the privileges and perquisites of the plantation residence—privileges and perquisites which are neglected or undervalued by absentee proprietors, if not absolutely thrown away.

The crop of 1854.—In the winter preparation of the rice fields, our planters, this year, have used the spade, turning the sod entirely over to the depth of eight inches, burying the stubble effectually. Owing to the prevalence of freshets through the winter, this experiment, made now for the first time, has not been fairly tried. Judging from the appearance of the produce, not yet threshed, the extra labor—fifteen hands to the task—is not compensated by increased quantity. There was no manifest difference between the plants on the spaded field and those adjoining until the ears shot out. Then it appeared that the heads were somewhat larger, but there was much less "volunteer rice," and less grass throughout the culture. It remains to be ascertained whether the quality of the grain is improved. Expecting a freshet in August again, I also tried on some old goose-grass land, draining poorly, the plan of planting in beds, which succeded so well on the same fields the year previous. The beds were made five feet apart, first roughly with the ox-ploughs, then with the hoes. Two trenches on the top of the beds were sown with sound seed, at the rate of a bushel to the acre. Treated with water, the growth was luxuriant, and the result is most satisfactory. The ears were large and full, curled outward, and hung in rich pendants over the broad alleys below, nearly closing in with those of the adjoining bed. The product unthreshed is not less than forty for one.

The rice-plant itself, when fairly rooted, is hardy, and the rough grain is not injured by any slight cause; but the blossom is very frail and delicate, easily affected by wet boisterous weather. On a still fair day in August, the plants, by nine o'clock in the morning, may be seen in bloom, which will be over for that day, and their office is performed probably within three hours after noon. Should stormy weather prevail, the blossom may wither in its birth, or, if it has appeared, be blasted without avail for fruit. Stormy weather in August, therefore, invariably diminishes the rice crops. The proof of this is the quantity of light rice made during the process of winnowing the grain.

The very necessary business of preparing the soil on rice plantations situated somewhat high up our rivers, was much impeded by the series of freshets which continued throughout the greater part of the winter last past. After putting the seed into the ground, the season generally was propitious. In the months of June, July, and August, whilst the rivers continued low and the tides receded well, the water used in the culture was fresh and turbid, serving at once to diminish the unhealthiness of the fields, and to manure them by the deposit of sediment, stimulating the plants more than usual to a uniformly better growth, everything betokening a fruitful year. The estimates of the general crop ruled high, and the heart of the reflecting planter bounded with grateful joy at the promise of a bountiful return.

This promise was in part realized. But while the work of harvest was progressing, the storm of the 7th and 8th of September lashed in its fury the whole extent of our coast, and raised the waters in the rivers to an unprecedented height, which swept off with the receding tide the product of hundreds of acres, blasting the hopes of many a too confident proprietor, and reducing the market crop of this State to a less amount, probably, than that of last year. Since the destructive gale of the year 1822, there has been no such tide on the coast of Carolina as that mentioned above. In height it did not reach the mark of 1822 by the seaside, but on the plantations it exceeded it by several feet. Fortunately, the greatest rise of water was in the day-time, and no lives were lost; but the rice cut and stacked in the field was floated off, in several instances, without any actual breach in the dams. For 10 or 12 miles up the rivers the water was salt on the 8th, and during the space of forty hours nothing could be done to diminish nor relieve the waste. The work of harvesting progressed irregularly. The few fine days after the gale were occupied chiefly in repairing damages; and soon after the wind shifted to the eastward again, causing high tides, which, with the exception of a few days, continued to prevail.

Those threatening tides, together with warm, moist weather, rendered the labor both trying and severe. It is in such a season that the skill and judgment of experience is invaluable. Whilst it is apprehended that some of the grain will be "mow-burned," it is believed, however, there will be more prime rice offered in market this year than was supplied by the crop of 1853.

So little time is consumed in boiling rice, twenty-five minutes, and so light and excellent is the food in all cases of disordered bowels, it seems to me it would be the interest of all parties emigrating to the West to take with them across the plains a good supply. If by any accident their stores get wet, they will halt and dry them in the sun. If it be spread out well it dries readily, and will be found less injured than any other grain. On the Mississippi it is alleged that the cholera has been less fatal on plantations where rice was freely used as diet.

The following table shows the comparative exports of rice from the port of Charleston during the years 1853 and 1854:

Comparative exports of rice from the port of Charleston.

Exported to—	From September 1, 1853, to August 31, 1854.	From September 1, 1852, to August 31, 1853.
	Tierces.	*Tierces.*
Liverpool	3,865	7,257
Scotland	....	4
Other British ports	3,339	4,032
Total Great Britain	7,204	11,293
Havre	5,630	2,668
Other French ports	1,552	1,847
Total France	7,182	4,515
Holland	139	199
Belgium	2,154	1,121
North of Europe	7,447	5,383
Total north of Europe	9,740	6,703
West Indies, &c	22,152	16,237
Total foreign ports	46,278	38,748
Boston	6,766	9,378
Rhode Island, &c	....	36
New York	41,050	44,930
Philadelphia	4,735	9,630
Baltimore and Norfolk	10,197	5,011
New Orleans, &c	16,176	17,683
Other United States ports	547	1,326
Total coastwise	79,461	87,994
Grand total	125,749	126,742

Comparative statement of rice, embracing stock on hand—receipts, and exports.

Stocks, receipts, &c., to dates.	Rice. 1854.	Rice. 1853.
	Tierces.	*Tierces.*
Stock on hand September 1, 1853	1,652	164
Received since August 24th	1,000	....
Received previously	137,634	....
Total receipts	140,286	140,894
Exported since August 24th	516	....
Exported previously	125,233	....
Total exports	125,749	126,742
On shipboard, not cleared	20	190
City consumption since September 1st	13,000	12,500
Deduct from total receipts	138,769	139,432
Remaining on hand August 31, 1854	1,517	1,462

CONDENSED CORRESPONDENCE.

Statement of John B. C. Gazzo, *of La Fourche parish, Louisiana.*

Rice can be very profitably raised on our lands in limited quantities. The yellow or golden rice is the best adapted both to wet and dry culture. It produces from 50 to 100 bushels of rough rice to the acre.

INDIAN MILLET, OR DOURAH CORN.

BY N. T. SORSBY, OF FORKLAND, GREENE COUNTY, ALABAMA.

Indian millet, (*Holcus sorghum*,) as its name implies, is a native of India, and is cultivated in most parts of Asia Minor, Africa, the West Indies, and Brazil. It has also been introduced into the south of Europe, China, Cochin-China, Japan, and into the southern and middle portions of the United States. In Arabia, it is called "Dora," or "Dourah," in France "Sorgho blanc," or "Doura," in the British West Indies "Guinea corn," in the United States "Dourah corn" and "Tennessee rice." It will grow to perfection from Pennsylvania to Texas, and doubtless would mature its seeds in most of the Western States south of Iowa.

I first saw this plant growing in Georgia in 1838. The year following, I introduced its culture into this county, where it has been somewhat extensively cultivated since. There are two distinct varieties of this corn cultivated with us, namely, the "White" and the "Reddish-brown." They are readily distinguished by the color of the seeds. The brown is preferred to the white, as it is more prolific in grain, which matures earlier and yields four times as much. The white is so late in maturing that the frost destroys much of it, and it yields so little grain, compared with the brown, that our planters have almost abandoned its culture. The meal, or flour, of the white is much lighter colored and nicer in appearance than that of the brown, the latter being dark colored by the pericarp and chaff. Both varieties grow well until checked by frost.

Cultivation.—This plant grows well on the poorest soils, and makes a good crop on our lime-stone rock, where there is enough of it disintegrated to support the stalk. The best soils are the light, rich, sandy loams, and the rich black lime-stone soils.

The land is ploughed into ridges, from three to four feet apart, just before the time of planting. In March, April, and May, and sometimes in June and July, these ridges are opened with a "scooter plough," and the seed either sown and covered with a harrow from an inch to one and a half inches deep. It is also sown broadcast, and covered with a harrow. In some instances, it is planted in the missing

hills of Indian corn. From one peck to a bushel of seed is sown to the acre. Plenty of seed, however, must be put in to secure a stand. If it is much weevil-eaten, and then covered too deep, it does not come up well. After it comes up, it will grow in spite of the frost, rain, or drought, being a very hardy plant.

When sown broadcast, it is not worked at all. If drilled, it is chopped with hoes to a stand and ploughed once, unless drilled for soiling, when it is not thinned out. If planted with Indian corn, it is cultivated with it. It needs but little culture. After it gets a start, it defies weeds and grass, and will make a crop in spite of every disaster.

Judging from my own observation, this corn will yield from 10 to 100 bushels of seed to the acre, according to the quality of the land and the mode of culture. It is sometimes cut green for soiling cattle and mules; and if properly done, so as not to injure the buds near the ground, it may be cut several times in a season. It is also cured and made into fodder, or hay. When intended for fodder, it is pulled, and cured like the stalks of Indian corn. The ears are cut as they ripen, and are preserved for seed, or fed to stock. The stalks are cut after the seed ripens, in September and October, and fed to animals. The ears are eaten entire by cattle and hogs. The stalks are sometimes cut before frost and put into barns, and then fed to stock. They remain green for months, and do not ferment nor spoil so soon as Indian corn and other grain.

The planters here, after gathering their seed, and curing as much as they desire of it, in September or October, turn all their stock into the fields to feed. No further care of them is necessary, except to salt and water them. If the field is large enough, in a short time, all will get fat on it, and leave the ground covered from ankle to knee-deep with the stalks. I have never heard of its killing any animals, and they will eat quantities of it, from the time it comes up until it disappears after frost. It is not only a harmless but a very healthy plant. Birds and weevils destroy much of it if the grain remains in the field until frost. Weevils are not so destructive after it is put into barns. Rats and mice will destroy it unless cared for.

Uses.—Besides serving as food for fowls and animals in Egypt, India, and China, it is used as food by the inhabitants. A failure of this crop in Arabia would be as great a calamity as almost that of the wheat crop. It is their food and fuel, and grows by scanty irrigation on land which produces scarcely any other grain. It is ground into flour, and cooked alone into cakes and bread, or mixed with rice-flour and other food. In Germany, it is substituted for rice, and sells for about the same price.

Taking into consideration the facts that it will yield more stalks, fodder, and grain, on a greater variety of soils, and with less labor, in any season, and return more litter to the land than any other grain, and being a universal food for man and beast, in tropical climates, it may be justly considered one of the most valuable of the Cerealia. There is a diversity of opinion whether this plant exhausts the land. As broom-corn is considered as exhausting, so may this be; but I am inclined to believe that it is not, since it returns so much vegetable matter to the soil in proportion to the small amount of grain removed.

It decays very slowly, requiring a year to do so if allowed to remain on the surface. Turned under with the plough, it decays much sooner, and no doubt, if previously limed, it would rot much sooner, and be a valuable manure.

POTATOES.

PRODUCTION OF NEW VARIETIES FROM SEED.

In autumn, soon after the appearance of the first heavy frosts, let the potato balls, or apples, be gathered, macerated in water, the seeds separated from the pulp, and put in some convenient place in the shade to dry; after which, they may be packed up in an air-tight bottle or box, and kept until required for use. As few of the early sorts produce blossoms, in order to produce seeds from them, deprive the plant of its tubers as they appear, and keep the runners from which they proceed above ground, by not earthing up the plant, and blossoms and seeds will soon appear. About the first of March, in the latitude of Washington, let the seed be sown in a hot-bed, in lines six inches apart, a quarter of an inch deep, and very thin. When water is necessary, after the seed is up, sprinkle it between the lines, but avoid wetting the plants, as that would injure them, taking care to give them a little fresh air before they are watered. As the plants increase in size, rich earth, carefully put between the lines, will add fresh vigor to them; but their tops must not be covered by the "moulding," or earthing up, which should occasionally be repeated until they are fit for transplanting. To prepare them for this, about the first of May, they must be plentifully refreshed with air, and two hours before removing them they must be copiously watered *all over*, and the glasses covered with mats, to prevent the sun, if shining at the time, from scorching the plants. Let the plants be taken up carefully, with a ball of earth attached to each, and planted in trenches, after the manner of cultivating celery, only with this difference: the distance from plant to plant in the lines must be eighteen inches; and if the sun should be shining out strong at the time, a flower-pot, or any other convenient article, may be placed over each, to prevent flagging; for, with all care exercised in taking them up, a good many of the fibres will be broken. After the plants have established themselves, remove the pot, and earth up occasionally, as long as the space between them will admit. The best manure employed in the operation is a mixture of rotten horse-dung and fine turf.

In plants produced from the seeds of the same ball, no two stems will, in all respects, possess the same qualities, yet many of the tubers will have so near a resemblance to each other that, when they are mixed together, they cannot be distinguished by the eye, though it may happen that one variety will be four times as prolific as the other, or may be much better in other respects. The tubers raised from the

seeds of the same ball are also prodigiously diversified in regard to *color*, being black, red, white, green, yellow, pink, &c.; to *shape*, as round, knobbed, and varied in all proportions; to *size*, some of them being no larger the first year than peas, while others exceed the size of a pullet's egg; to *earliness*, some of them completing their growth in July, while others will not put forth their blossoms before October; to *productiveness*, some yielding more than two hundred, while others will give only three or four-fold; to *spreading under ground*, some running out to a great distance, others growing quite near to the stem, some descending deep into the earth, while others will rise to the surface to *quality*, some being tough and watery, some dry and mealy, some very pleasing to the taste, and others will not be palatable at all; and as to *stems*, some will carry a single stalk, like a rod, others an immense profusion of them, some being very luxuriant, while others will be extremely dwarfish. In short, what is very remarkable, no sort of connexion will be found to exist between any two peculiarities. Few plants which may resemble each other above ground will often be found extremely dissimilar below the surface, while two tubers which apparently resemble each other will sometimes be so different in quality, when tried for eating, that one will perhaps be among the best and the other among the worst of the parcel. Hence, the benefit which may be derived by a cautious selection from seedlings is obvious, as well as the evil consequences that may result from a careless observance of these facts.

This subject is particularly worthy of the attention of the agriculturists of the Carolinas, Georgia, and Florida, where pine forests abound, the leaves, or needles, of which are well known to be rich in alkaline salts, as well as in possessing other properties congenial to the healthful growth and perfection of the tubers of this plant, when used as a manure. It has been stated that the common potatoes which are cultivated in the lower parts of these States are inferior in quality, and are found to be comparatively worthless when sent to the Northern markets for culinary use. Certainly, this inferiority cannot be the effects of the soil nor of the climate, as some of the finest potatoes in the world are produced on the Bermuda isles, as well as on the sand-hills of Louisiana, which must be attributed to the peculiar varieties cultivated, rather than to the climate or the soil. The suggestion is here offered of producing on the spot new seedlings from the potato-balls in the piney regions of the above-named States, until a number of varieties have been obtained, which would not only be well adapted to their own proper localities, but possessing at the same time, among other good qualities, that of long-keeping, which would render them particularly valuable in the early spring markets at the North. D. J. B.

PRESERVATION OF POTATOES FOR SEED.

BY J. N. CHANDLER, OF ADRIAN, LENAWEE COUNTY, MICHIGAN.

The potato, when first obtained from its native mountains, was a small, watery and even bitter tuber. By cultivation it has been brought into so high and refined a state that most of the countries of the civilized globe look at it as one of the most important articles of food How has this great change been brought about? How has every one who has planted the potato assisted in refining it? Generation after generation has adopted the same treatment which has wrought this change. It may be asked by what means? I answer, *by violating the laws of nature.*

The natural place for potatoes is in the earth; but most of those which are used for planting are out of the ground from five to seven months in the year. When we dig them in the fall, we find them, if matured, when baked or boiled, to be dry and mealy. They are generally put into cellars to remain until spring. As warm weather approaches, they are often removed to some out-building, to remain several weeks, which renders them less fit to grow. Out of this out-building we select our potatoes for seed, although some of them may not be planted before the middle of June—much wilted, of course—and the remainder are left for summer use.

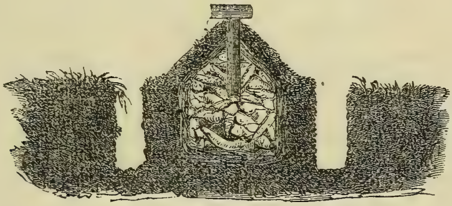
Every one who has ever noticed the difference between the flavor of a potato in the fall, when first dug, and one in spring which has been kept in a large dry cellar, has observed that the flavor becomes much impaired—much more so than those which are buried in holes in the earth, where they retain nearly all of their freshness and vitality. It has also been observed that farmers who have small and inconvenient cellars keep their potatoes in better condition than those who keep them in large cool ones. Hence, by storing them in the latter, and letting them wilt before planting, they become weakened in their nature, and are subject to degeneracy, and finally to disease.

In order to obtain good potatoes for seed, make choice of a small spot of arable land on which water will not stand—an eastern slope and new ground are the best—ploughed early in the spring, and furrowed 4 or 5 inches deep, 2½ feet apart. Select middling-sized potatoes which have touched the ground during the winter previous, but do not cut them. Drop one every 8 inches along the furrows, and cover them by filling the furrows with earth. Then cover them with a top-dressing of forest leaves or straw 2 inches deep. As soon as the tops of the young plants are 2 inches high, pass between them with a shovel-plough, follow with a hoe, destroying the weeds and levelling the ground; do not hill. This is all you have to do until fall. When the ground begins to freeze, cover with straw, chaff, or forest leaves, 6 inches deep, to keep them from frost. Your potatoes will now have a chance to ripen and rest during the winter. In this way, you will have the greatest yield and best quality. Continue this course from year to year and the rot will not only disappear but your crop will increase from

25 to 100 per cent. The third year, you may increase your field crop by ploughing in fine manure. You will now have had Nature's course.

ALGERIAN MODE OF PRESERVING POTATOES.

The farmers of Algeria preserve their potatoes during winter by the following method, which, doubtless, would do well if adopted in our Middle and Southern States: They dig a pit from 1 to 3 feet deep, 3 feet wide, and of any required length. The tubers are heaped up in it in the form of a ridge or the roof of a house, covered with straw and afterwards with earth to a depth of 1 or 2 feet, well beaten down with the back of a spade. To prevent the penetration of water or moisture, they dig other pits or trenches on each side, somewhat deeper than the one containing the potatoes, as indicated in the diagram below:



For the purpose of allowing the escape of heated gases or air, openings are made along the top of the ridge and two hollow tiles inserted, extending down among the tubers, with a third tile placed over the top to prevent injury from rain. D. J. B.

CONDENSED CORRESPONDENCE.

Statement of GIDEON LANE, *of Killingworth, Middlesex county, Connecticut.*

Potatoes are raised quite extensively in this vicinity, although injured very much by the rot for the last three or four years.

The ground is generally prepared by turning coarse manure under the furrow and putting guano in the hill. Sometimes the guano is sown broadcast and ploughed in. Potatoes are planted from the middle of April to the middle of May. The average product is not far from 150 bushels to an acre.

Statement of ELI GOODRICH, *of Branford, New Haven county, Connecticut.*

The yield of potatoes has become very small in this section. We have tried almost every means to improve the crop, such as shifting the seed, introducing new varieties, and varying the time of planting, but without success. Yield from 50 to 150 bushels to the acre. Price from $1 to $1 50 a bushel.

Statement of EDWARD F. GARLAND, *of Aroostook, (No.* 11, *range* 5,) *Aroostook county, Maine.*

The average yield of potatoes I should judge to be 200 bushels to the acre. We plant mostly on "burnt land," without ploughing. The most prolific variety is the "Chenango."

Statement of HENRY H. HOLT, *of Cascade, Kent county, Michigan.*

Common Irish potatoes have not yielded more than 100 bushels to the acre for the last two years, owing to the drought. The "rot" has not affected this tuber, with us, to much extent for a number of years. The favorite varieties are the "Western Red," the "Mercer," and the "Early Pink-eye." Price from 38 to 75 cents per bushel.

Statement of C. F. MALLORY, *of Romeo, Macomb county, Michigan.*

The yield of potatoes varies from 150 to 300 bushels an acre. Cost of raising, from 12½ to 15 cents a bushel. Market value, 37½ cents a bushel.

Statement of LORENZO ROUSE, *of Paris Hill, Oneida county, New York.*

Potatoes are successfully and somewhat extensively cultivated in this vicinity. Since the commencement of the "potato disease," the aggregate product has been greatly reduced; but the increased price has continued to furnish remunerating profit to the producer. While the average has diminished more than one-half, the price per bushel has more than doubled, thus furnishing a greater return for a much less quantity of heavy cartage. Most of the fine varieties formerly cultivated, such as the "Pink-eye," the "Mercer," and the "English White," have been abandoned, and those less liable to disease substituted, such as the "Boston Red," the "Carter," and the "Mackinaw."

Owing to the excessive drought of the last summer, the potato crop suffered exceedingly, and at one time fears were seriously entertained that it would prove an entire failure. The early varieties suffered most, having matured before getting any respectable growth. The later kinds were materially benefitted by early fall rains; and although producing but few to the hill, were of fair size, or excellent quality, and entirely free from disease.

The price of potatoes was as high as $1 per bushel during the summer, in the Utica market. Since the crop was harvested, prices have ranged from 50 to 75 cents per bushel. Large quantities of potatoes are annually shipped by canal from this county. Over 2,000 barrels have been sent from the village of Clinton, on the Chenango canal,

located about five miles from us, this season; and the quantity shipped from Utica, our principal market, and about ten miles from us, was, no doubt, far greater.

The average yield to the acre may be estimated at 120 bushels for the present season; but the crop will sometimes be found to vary from 50 to 300 bushels to the acre, according to the soil, season, &c. The cost of production, I have usually found to be about $20 per acre, including labor, seed, use of land, and other expenses. At 40 cents per bushel, 50 bushels per acre would cover all expenses. All above that quantity would, therefore, at usual prices, be a clear profit.

The potato may almost be considered as a staple crop in this portion of Oneida county; and the quality of those produced in this vicinity being considered quite superior, they always find a ready market. A failure of the crop would truly be, to our farmers, a serious calamity.

Statement of PETER REID, *Lake Post Office, Greenwich, Washington county, New York.*

The cultivation of potatoes in this section, from the high prices which they bring in market, and the occasional exemption from the "rot," has of late occupied great attention among our farmers. The "Mercers," "Mountain Junes," and the "Michigan Whites" are general favorites.

Statement of D. C. M. EVANS, *of Scio, Harrison county, Ohio.*

Potatoes are not a sure crop with us, though cultivated to some extent. They do best on old pastures, without manure, and on dry land. Average yield, 200 bushels to the acre. They are worth at present $1 a bushel.

Statement of ELIAS GREEN, *of Wakeman, Huron county, Ohio.*

The rot prevails extensively among our potatoes. Our practice is to plant early, the sooner after the frost is out of the ground the better. A dry, sandy soil is best; and experience has proved that no unfermented stable manure should be used. Plaster and ashes can be applied with good effect. For seed, the medium-sized, sound, healthy potatoes should be selected, and planted whole, at a depth of 3 inches. At hoeing, 3 inches more of earth should be drawn upon each hill. The potatoes should be dug early, and put into the cellar perfectly dry. The average price for the last few years has been about 40 cents a bushel.

Statement of JOSEPH TASKER, *of West Rupert, Bennington county, Vermont.*

Although our potatoes have been much affected by the rot for the last few years, the high prices which they have brought in the market, in consequence, have made them a profitable crop. They are more productive and less liable to rot if planted on upland having a dry, slaty soil. This is especially the case with the "Carter" variety, which is most raised here, bringing the highest price in market. If

planted in a moist, rich soil, they are almost certain to rot. But the "Mountain June" potatoes produce as well as the "Carters" in such a soil, and are not so liable to rot. The "Reds" should be planted on new land to secure a good crop free from the disease. The "Long Johns" are most prolific in a deep loam. Plaster is very beneficially applied to potatoes, both in the hill and as a top-dressing.

A crop of potatoes must produce about 30 bushels to the acre in order to pay the expense of cultivation. Yield, from 60 to 120 bushels to the acre; worth from 60 cents to $1 a bushel. Cost of transportation to Boston or New York, from 15 to 23 cents a bushel.

Statement of Dr. Henry M. Price, *of Nicholas Court House, Virginia.*

The soil and climate of this region is peculiarly adapted to the growth of the potato. In some parts of the county the yield varies from 300 to 600 bushels to the acre. They are uncommonly large and finely flavored. The cost of raising is about 5 cents a bushel. They are sold for 25 cents.

Statement of Gustavus de Neveu, *of Fon du Lac, Fon du Lac county, Wisconsin.*

Potatoes which, from all accounts, have failed over a large portion of the United States, have yielded the last season very well here, some fields turning out as high as 200 bushels to the acre, while the general average will not be less than 160 bushels. This tuber appears to have again returned to its normal healthy state, and the "rot" seems to live only in our memory. Price 25 cents per bushel.

Statement of William Alverson, *of Beloit, Rock county, Wisconsin.*

Potatoes yield well in this county, and are beginning to be extensively exported. They are worth 40 cents a bushel at Beloit. The varieties raised are the "Mercer" and "Pink-eye."

SWEET POTATOES.

CONDENSED CORRESPONDENCE.

Statement of John B. C. Gazzo, *of La Fourche parish, Louisiana.*

Sweet potatoes grow to perfection in this region. The plants are started in beds, then transplanted to hills about 2½ feet apart each way, at the rate of two or three in each. A small shovelful of leached ashes is put in each hill. The crop should be hoed about three times.

Statement of Henry H. Holt, *of Cascade, Kent county, Michigan.*

The cultivation of the sweet potato has been quite successful here for the last two years. The soil seems well adapted to its growth, and the season sufficiently long.

Statement of FRANCIS FULLER, *of Winthrop, Kennebec county, Maine.*

Several attempts were made last year to raise the sweet potato, with a fair prospect of success. They grew to a good size, but did not acquire that sweetness of flavor peculiar to those at the South.

Statement of GEORGE C. BRIGHTMAN, *of Goliad county, Texas.*

The sweet potato is the most abundant of all the root crops in Texas. The "bedding" should be done early in the spring. The ground is prepared by ploughing very deep, and throwing up into large ridges. The "slips" should be set out as soon as they are large enough; but the planting may be continued until the first of September, and then give time for the potatoes to mature before frost.

The "Yam" is the best and most productive, frequently weighing from 8 to 12 pounds each, and yielding from 300 to 400 bushels to the acre.

THE CHINESE YAM.

Of all the plants which have been proposed as a substitute for the common potato, no one appears to have so many chances of success as the Chinese yam *(Dioscorea batatas.)* It is particularly worthy of a place in the kitchen garden, as well as in field culture, on account of its perfectly feculent flavor and the absence of any after-taste of sweetness, acidity, or spiciness, such as is often found in other plants; as also on account of the ease with which it can be cultivated and multiplied, and the facility of preserving it from decay. These are the important points by which, if once adopted, it must be judged; and whence its cultivation will be extended and improved for general use, as it is believed it can be, by intelligent hands.

This yam was sent from Shanghai, in China, by the French consul, M. de Montigny, some five or six years since. It is everywhere cultivated in that country, and bears the names of *Chow-Yu*, *Tchou-Yu*, *Tou-Tchou*, *Chan-Tchou*, *Chan-Yo*, and *Chan-Yu*, which signifies "Arum of the mountain." At Nankin, it is very large and of excellent flavor; that of the country of Chou is better still; but for medicinal purposes, they prefer that of the Chou-Yu of Hoaï-King, where the root is laxative and sweet. It belongs to the family of Dioscoreæ, having annual stalks or vines, and perennial roots. The leaves, in general, are opposite, triangular-cordate, acuminated above, with round basilar lobes; having seven or eight principal nerves converging towards the top, between which is a net-work of secondary fibres crossing each other. They are about equal in length and breadth, having a smooth and glossy surface, and of a deep-green color. Their petioles, or foot stalks, extend about half their length; they are strongly canaliculated, or furrowed above, and are of a violet color, which shows itself from

the moment they spring forth. The flowers are diœcious, that is, the sexes growing on different plants, disposed in speciform bunches at the

junction of the leaves. The corolla of the males is composed of six petals of a pale-yellow color; the three outermost ones rounded, and the three inner smaller ones of a roundish oval. The stamens, six in number, are extremely small, although well defined; and the anthers

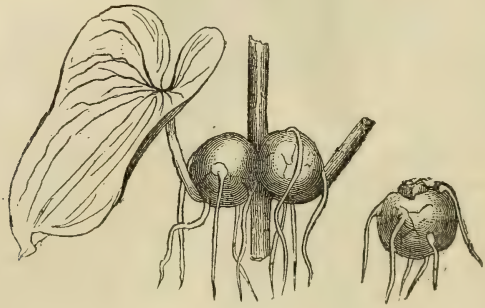
are oval and supported by short filaments, grouped freely in the centre of the flower. As the male plant only has been introduced, the female cannot be described, and consequently no seeds produced before the latter can be procured. See engraving on opposite page.

The roots, or tubers, vary in length and thickness, according to the nature of the soil, in reference to lightness, depth, and tenacity, which, no doubt, influences their form and mode of development. The maximum size to which they grow is about two inches in diameter, the larger end tapering upwards to the size of the finger, as indicated in the cut above. They are covered by a brownish fawn-colored skin, pierced by numerous rootlets. Under this envelop, is a cellular tissue of a white opal color, very crispy, filled with starch and a milky, mucilaginous fluid, with scarcely any ligneous fibre. In cooking, this tissue softens and dries, but to a greater degree, like that of the common potato, the taste of which it much resembles. Each plant often produces several tubers, though generally it has but one. They usually weigh about half a pound each, but sometimes three pounds, running perpendicularly into the earth to the depth of a yard. M. Decaisne, of France, says, however, that those cultivated by him rarely exceeded 15 to 20 inches in length.

The cultivation of this yam appears to be easy and simple. M. Decaisne, in the "Revue Horticole," for 1854, has described the method

adopted in China, which is nearly as follows: In autumn they choose the smallest tubers, which they preserve from injury by frost by covering them in a pit with earth and straw. The spring succeeding, they plant them near each other in a trench, in well-prepared soil. When they have put out shoots one or two yards in length, they cut off the joints and leaves containing the buds, and plant them for reproduction. For this purpose, they form the ground into ridges, on the top of which a shallow trench is made with the hand, or some suitable implement, in which these joints are planted, covering them slightly with fine earth, with the leaves rising just on the surface. Should it rain the same day, they shoot immediately; if not, they water them gently until they do. In fifteen or twenty days, they give birth to new tubers and stalks, the latter of which it is necessary to remove from time to time, to prevent them from taking root on the sides, and thus injure the development of the tubers already formed.

The method which has been found to answer best in France, according to "Le Bon Jardinier," for 1855, consists in cutting the tubers into fragments of moderate size, placing their crowns, or eyes, in small pots, in April, and then transplanting them into a deep, rich soil as soon as the spring frosts are no longer to be feared. Notwithstanding the plant has a tendency to plunge its roots into the earth perpendicularly, any distortion to which it might be liable in the pot will not be in the least prejudicial to its future growth, as is the case with other yams. It is even thought that its cultivation in large pots, buried under ground, might be successfully adopted in some cases, particularly where the soil is of a permeable nature, which would allow it to extend its roots to a depth of more than a yard.

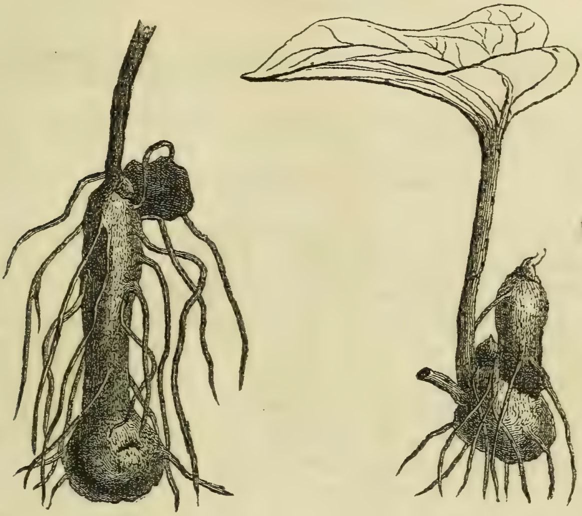


If it is desired to multiply the plant rapidly, in a high latitude, it can be done by means of suckers, or slips. To this end, there may be cut in June or July as many slips as there are sets of leaves on the vine, and plant them side by side under a glass in a light, sandy soil, sufficiently deep for the bud at the base of the leaves merely to be covered. The better way is to let the leaves remain entire, unless they are disproportionably large. In about five or six weeks, the slips will take root, and present at the angle of each leaf a small tuber about the size of a pea, as denoted in the cut above.

These scarcely increase in size during the season, but become sufficiently ripened, on ceasing to water them, to replant in the spring,

when they will grow with as much vigor as if produced from the cut tubers, as shown in the figures below.

In this manner, each plant may be made to yield a hundred fold. The reproduction from the vines, however, may be brought about in more temperate latitudes, by planting them in a garden in the open air. In this case, it is better not to cut up the vines, but to bury them horizontally just below the surface, with the midrib of the leaves resting on the ground. Should there not be sufficient rain, the soil must be kept moist by slight waterings at the close of the day.



If we may judge by the stagnation of its vegetation during drought, this plant seems to require irrigation, or watering. The leaves and vines are small considering the size of the roots, and will probably allow of close planting, say eight or ten to the square yard. The vines in general, when not propped up, spread over the ground without taking root, intertwining with each other; but do not grow to that length as when propped up by poles or stakes. In one instance, in France, a strong pole about ten feet in height above ground was inserted near one of these plants, which wound itself regularly around it and soon overreached its top. This yam requires no cultivation other than that of eradicating the weeds, as the operation of earthing-up is regarded as quite superfluous.

What may be the result of meteorological influences on this product in different climates and seasons cannot at present be determined. In the neighborhood of Paris, last year, it made rapid progress; the long vines growing vigorously and putting forth an abundance of leaves. Towards August, many flowers of the male kind appeared, and by the middle of September the vegetation was insensibly checked, assuming a yellow tint, indicating that the period of maturity of the tubers was near at hand, which, however, were not dug before the 6th of November.

The expense of labor may be more than that of the potato, but it will be amply compensated by the prolific result. To facilitate the

extraction of the tubers from the earth, it is recommended that they be planted as near as practicable in bunches, or hills.

This root, it will be seen, is voluminous, rich in nutritive matter, and can be cooked in every respect like the common potato, and can even be eaten in the raw state. It also bids fair to become a source of as much profit to the cultivator, richer in fact in nutriment, and therefore is believed to be destined to render even greater service to the world. D. J. B.

TEXTILE AND FORAGE CROPS.

REMARKS ON CLEANING FIBRES OF TEXTILE PLANTS.

[Condensed from the Singapore Free Press.]

As the fibres of Indian plants are now beginning to attract the attention of European manufacturers, it may be of some use to publish the results of experiments which have been tried to prepare them for the English market, and to turn them to practical account in India. The demand for fibrous substances as substitutes for flax, hemp, silk, cotton, and hair is now becoming so great that the market cannot be supplied with a sufficiency of these raw materials to keep our large manufactories in full operation, and India is now looked to as the country whence these supplies must be furnished.

Flax, hemp, and cotton are the substances most urgently called for; and as the first two are wasted in large quantities in many parts of India, and are hardly ever prepared with sufficient care to make them profitable articles of export, a description of the simplest and most economical methods of cleaning them may prove of interest to the public.

The usual process followed in India for preparing the fibres of succulent, fleshy plants consists in cutting them when in full vigor, and burying them in wet sand on the banks of a running stream, or in mud at the edge of a tank, and leaving them there to soak and rot for one, two, or three weeks, according to the temperature of the weather. The plant is then taken out and spread in the sun to dry, after which it is stacked, or put up in heaps, and covered with a matting of dry leaves to shelter it from wind or rain. It is afterwards beat with heavy sticks upon the dry, hard ground, and well rubbed between the hands, to separate chaff and dust. Another method is to take the soaked plant in bundles, and beat out the pulp and impurities on a flat stone, at the edge of the tank, or river, in the same way as the washerwoman washes clothes.

The fibres of the "marool" (*Sansevieri zeylanica*) are prepared by scraping and washing in fresh water soon after the plant is cut. The fibres of the "yercum" (*Calotropis gigantea*) are separated by exposing to the sun for three days the fresh-cut stalks of the plant, stripped of the leaves. The bark is then peeled off, and the fibres are picked out with the finger and thumb. The last two processes yield fibres of good

quality, but in two small quantity to prove remunerative, except as an employment for children. The system of cleaning fibres by rotting is not suited to warm climates, as putrefaction sets in almost as soon as fermentation; and while one part of a heap of leaves or stalks is beginning to ferment, other parts are brown and stained from putridity, while the central parts remain fresh and unaltered. To preserve the color and strength of fibres all that is necessary is to separate the pulp, bark, or wood, as soon as possible, and by the least complicated process. The pulp or juices of plants usually contains mucilage, starch, or gum, which begin to ferment within twenty-four hours after the plant is cut; and if they be left in water during warm weather, fermentation is completed within two or three days. In cold climates, it takes from three to four weeks to run its course. The result of fermentation being completed is, that the sap becomes acid, and destroys the strength of the fibre. This is followed by putrefaction, which stains the fibre, and makes it brownish, and brittle like chaff.

If the plant be exposed to the sun for a day or two after being cut, the sap dries, and the coloring matter stains the fibre, which cannot then be easily separated from the bark, spiral cells, nor woody fibre. In some plants this discoloration is green, in others brownish, or dusky yellow, which cannot be removed by bleaching, as it is a species of natural tanning which occurs in the plant. Such fibres always remain harsh, stiff, and woody, with a tendency to snap on a sudden strain. The plantain fibre is the most liable to this defect, from the sap containing a good deal of tannin, which can only be removed by quickly expressing the juice, and cutting as much of the plant as can be cleaned in one day.

The general rules for cleaning the fibres of pulpy plants are, first, to bruise or crush the plant, keeping the juice for a coarse kind of vinegar, required in another process. The common native sugar-cane mill, with two perpendicular rollers, a long lever handle, and a channel to convey the juice into some convenient vessel, answers this purpose very well.

When it is in a pulpy mass, the fibre must be taken at both ends and twisted opposite ways, to squeeze out the sap. It is then to be well washed in plenty of water, untwisted and scraped, in small handfuls at a time, on a board, with an old blunt table-knife, or a long piece of hoop-iron, fastened into a straight handle. When all impurities are removed, the fibres may be soaked for an hour or two in clean water, and then hung up in the shade to dry. Exposure to the sun at first is apt to discolor them. By this simple process fibres of great strength, of a silky appearance, and of a good color, can readily be prepared. The scrapings must be well washed and set aside in the shade to dry as tow, for packing, or as materials for making paper.

The Indian plants, to the cleaning of which this process is applicable, are those of a fleshy or pulpy nature, as the aloe, agave, sanseviera, and plantain genera, of which there are many species. The prices offered in England for Indian fibres ,thus cleaned, varies from £25 to £70 per ton. Fibres of the same plant, cleaned by the usual Indian process of rotting, and sent home at the same time, are valued at from £12 to £18 per ton, and are said to be only suitable for the manufacture of

coarse twine, or brown packing paper. The finest plantain fibre, when carefully cleaned and dressed, is said to be suited for the imitation of silk in carriage-braid and carpet work. The average value put upon the fibres is £50 per ton, when Russian hemp is selling at £40 per ton. A profitable export of plantain and aloe fibres has now been established on the west coast, and is likely to be extended to other parts of the presidency.

Many of the Indian cordage plants are those having bark and woody fibres, and the native process of cleaning them is very similar to that followed in cleaning fleshy and pulpy plants, namely, by burying in sand or mud at the edge of a tank, or in a river, and leaving them to rot. There is this difference, however, that the plants are steeped longer, and are never exposed to the sun to dry, or stacked and covered with matting, to be cleaned by dry beating. If this were done, the woody fibre would get hard and brittle, and would again adhere to the other fibre, which, being partially rotten, would break in the cleaning. To obviate this, the rotted plant is taken up in large handfuls, and beaten on flat stones, first at one end and then at the other, in the same way as clothes are washed by the washerwoman. They are next well rubbed and washed, to separate the impurities, and are spread out on the ground to dry. We can hardly wonder that most of the string and rope made from fibres, prepared in this rude, coarse way, should be dark in color, possessed of no strength, and of little value. As a general rule, every day's steeping of a fibre takes from its strength, and imparts more or less color. To obviate this, woody plants should be first well beaten with a mallet, then the bark separated from the stalk, for it is on the inner part of the bark that the fibres for cordage usually occur. When the bark is brought to a pulpy state, it must be well washed in clean water, to remove as much of the sap as possible, for this is the destructive agent, which soon causes putrefaction.

The old mode of steeping, or rotting, flax plants is quite abandoned in many districts, as the water was found to be poisonous to cattle and fish, and the neighborhood where it was carried on became feverish. The same remark has been made in India; and there are many districts where flax is cultivated on account of the linseed, but the plant is burnt, and the fibre washed, lest cattle should be poisoned by eating it. In Flanders, where the greatest care is bestowed on the growth of flax, the preparatory crops are barley and rye, with turnips after them, the same year. It is grown the third year of a seven-course rotation, or the fifth year of a ten-course rotation. It is considered an exhausting crop, and the land is richly manured and dressed with liquid manure; the seed is then sown abundantly to the proportion of 160 pounds to the acre; a slight harrowing, and the passing of a light roller over the ground, ensuring quick germination. If the quality of the fibre be the chief object, the seed is sown thickly; the plants come up in a crowded manner, and are tall and of delicate growth. If the seed be the chief object, then wide sowing and exposure to the sun, is the best, the stalks becoming strong and branched with coarse fibre. The weeding of the flax forms a considerable item in the expense of its cultivation. This is performed when the plant is a few inches high. It is done by hoeing, or by women and children, who, with coarse cloths around their knees,

creep along on all-fours, which injures the young plants less than walking upon them. The weeders also take care to face the wind, that the tender flax, bent down by their weight, may be assisted in rising again. When weeding is too long delayed, the plants are bruised and injured; nor can they recover their erect position. Some tall and slender varieties are supported by stakes, lines, and cords, about one foot eight inches from the ground, or ropes are tied to stakes lengthwise and crosswise, so as to form a net-work all over the field. The time of pulling the crop depends upon the season and the intention of the grower. If fine fibre be his object, he pulls the flax rather green; but if the quality of the seed be considered, a longer time is given before pulling. The latter object is generally attained when two-thirds of the stalk have turned yellow, and when the seeds have changed from their fluid state, for they ripen sufficiently after the flax is pulled if not separated from the stalk. Taking up the crop in a wet state is avoided if possible. The pulling is carefully done by small handfuls at a time, which are laid regularly across each other to dry, and are afterwards collected in larger bundles, the root-ends on the ground, and the seed-ends tied lightly together, as sheaves of grain in the harvest-field. The practice of cultivators differs very much as to the after processes. Some disregard the seed, and commence steeping the flax at once; some a process called "rippling;" others house the flax as soon as it is dry, carry it as soon as it is dry under a shed, and take off the capsules by allowing the seed to remain on, and deferring the processes of rippling and steeping until the following season.

COTTON.

HISTORY AND CULTURE IN MISSISSIPPI.

[Condensed from Wailes' Report on the Agriculture and Geology of Mississippi.]

When and from whence the cotton plant was first introduced into Mississippi is not certainly known, most probably by the early French colonists from St. Domingo, which was a touching point for the Company's ships, and the place whence they derived much of their supplies. It would seem, indeed, that its cultivation here and in Louisiana, on a small scale, for domestic purposes, preceded that of Georgia. Charlevoix, on his visit to Natchez, in 1722, saw the cotton plant growing in the garden of Sieur Le Noir, the Company's clerk. Bienville states, in one of his dispatches, dated in April, 1735, that the cultiva tion of cotton proved advantageous.

It is stated by Major Stoddard to have been cultivated in the colony in 1740; and Judge Martin quotes from a dispatch of Governor Fau dreuil, of 1746, to the French minister, in which he mentions cotton among the articles received by the boats which came down annually from Illinois to New Orleans. This period was some thirty years prior to that in which it is claimed to have been cultivated in Georgia.

Among the varieties of the cotton plant may be enumerated the "Sea Island," the "Upland," the "Tennessee Green-seed," the "Mexican," "Pernambuco," "Surinam," "Demerara," "Egyptian," &c. The four first named are those which have been chiefly cultivated in Mississippi.

The "Sea Island" is confined to a very few plantations on our seaboard. It is superior to all others in length and fineness of fibre, and is on that account in much request on the continent of Europe, for delicate and costly fabrics, such as laces, and for intermixture with silk goods; it bears a high price, generally thrice as much as the best "Uplands;" but, being necessarily prepared for market in the roller-gin, at a heavy cost of time and labor, and being more difficult to gather, is upon the whole not more profitable than the short staple.

The "Upland" first cultivated here, differs from the preceding in the color of the blossom, the size and form of the boll, or capsule, and in the length and fineness of the staple. Both have the smooth, black, naked seed. All other varieties seem to have a tendency to return to this by long continued cultivation.

The "Tennessee" cotton has a seed invested with a thick green down, adhering firmly to it. It is difficult to gather, and superseded the latter, or "Black-seed," for a few years, from its freedom from the rot—a disease with which the latter became infected.

They both gave way in time to the "Mexican," which is now itself chiefly cultivated, or is the basis of all the varieties now in favor.

The superiority of this cotton consists in its vigorous growth, the size of the boll, and its free expansion, affording a facility of gathering by which three times the quantity can be picked, as was formerly the case. The objections to it originally, and these have been in a great degree corrected, were the coarseness of the staple, and the loss sustained by its falling out, if not speedily gathered. Like the Tennessee, the seeds, although larger, are coated with a coarse, felt-like down, of a dingy white or brown color. The Mexican seed is believed to have been first introduced by the late Walter Burling, of Natchez. It is related by some of our older citizens, who were well acquainted with him and the facts, that, when in the city of Mexico, where he was sent by General Wilkinson, in 1806, on a mission connected with a threatened rupture between the two countries, in relation to our Western boundary, he dined at the viceroy's table, and in the course of conversation on the products of the country, he requested permission to import some of the Mexican cotton-seed—a request which was not granted, on the ground that it was forbidden by the Spanish government. But the viceroy, over his wine, sportively accorded his free permission to take home with him as many *Mexican dolls* as he might fancy—a permission well understood, and which in the same vein was as freely accepted. The stuffing of these dolls is understood to have been cotton-seed.

Many accidental varieties have been introduced of late years, originating in a promiscuous cultivation of different kinds, by which the pollen became intermixed, and the different qualities assimilated.

Some new and excellent varieties have thus been produced, which have been preserved and further improved by a careful and judicious

selection of seed in the field. These, together with some spurious kinds, which have been palmed off upon the planter from time to time, have been known by rather whimsical and fantastic names, having little or no relation to their distinctive character. Many of them have had their day, whilst others deservedly maintain the high estimation to which their superior qualities entitle them.

Mode of Planting and Cultivating.—There must ever be some diversity of practice in the details of all agricultural operations. The character and situation of the land, the nature of the soil, the variations of the seasons will influence these more or less. The following details, therefore, must be received as descriptive of the general practice under the most usual combination of circumstances:

We will suppose that the land has been previously cultivated in cotton, and has been already laid off and "circled" according to the undulations of the surface, at distances suited to the quality and capacity of the soil. The cotton stalk of the previous year, having become sufficiently decayed and brittle, is first beaten down and broken to pieces, and left strewed upon the ground. This is done by the women and the younger hands, provided with stout sticks or clubs suited to the purpose. Between the rows of the previous year, a furrow is now run with a bar-shear plough without a coulter, and two other furrows are lapped upon it. In this state it remains until all the ground is gone over and the season for planting approaches. Two or more furrows, according to the width of the row, are then thrown up on both sides to the previous ridge, and the middles are thus broken up.

So far, the work has been done with large two-horse ploughs suited to breaking up the hard ground. In the subsequent cultivation, a lighter one-horse plough is used. Over the bed, or ridge, thus formed, if the rough and lumpy condition of the ground requires it, an iron-toothed harrow is drawn, and the ridge is split or opened by a small plough, or more usually by a lighter implement contrived for the purpose, and consisting of a suitably fashioned block preceded by a coulter.

In the furrow made by the opener, the cotton seeds are sown by the women from a quantity carried in the apron, gathered together at the lower end, and held by the left hand so as to form a sack, which is replenished from time to time from piles of seed previously deposited in the field at convenient distances. The sowing is done adroitly at a brisk pace by a vertical or downward movement of the arm, by which the seeds are strewn along the row several feet at each cast of the hand, and with requisite regularity. A light harrow follows, to the hinder part of which is frequently attached a small roller, which smoothes down and compresses the loose soil over the seed.

When the cotton has come up and grown to a height of a few inches, in a week or ten days, it begins to require thinning out and scraping. This was formerly done almost entirely by the hoe, by which the grass and cotton on the sides of the ridge were scraped away, and the cotton "blocked out" in the row by cutting it out to the width of the hoe or about 12 or 14 inches. It is now performed by first running a bar-shear plough lightly on each side of the row, and

"barring off," as it is called, and throwing the dirt from the plant. The process also is greatly facilitated by the use of a properly constructed scraper, an implement of modern, and not yet of universal, if of general use, which acts well and saves a great amount of labor to the hoe hands. It is desirable to follow this operation with as little delay as practicable, the ploughs on this occasion giving an inverted direction to the soil, and throwing it back to the plant with the mould-board, a process which is termed "dirting," or "moulding," the cotton. The hoes follow immediately, thin out to a "stand," leaving one or two of the most vigorous and promising plants, freeing them from grass and drawing the loose soil well around them for their better support. If the planter has accomplished this much of his work thoroughly and in good season, his crop may generally be accounted safe.

The after cultivation is varied according to the nature of the season, and the plough, hoe-harrow, or the sweep, will be used as they may be found best adapted to the condition of the crop. The latter implement is, like the scraper, of modern introduction. It resembles one of the hoes of a harrow flanked with wide cutting blades, or wings, forming two sides of a triangle, and mounted on a plough-beam, is capable of sweeping the whole width of the row, or the greater part of it, at once, loosening the soil and destroying weeds, vines, and everything that does not require to be turned under and effectually buried. It is a very efficient tool, and is employed with advantage, and especially in dry seasons, in keeping under the "tie-vine," (Convolvulus,) which, if not thoroughly done, is an after source of great annoyance and damage. This course of cultivation supposes the planter to have kept pace with the regular order of his work; but if, from a backward season and late frosts, he is compelled to replant, or if, from an unusual prevalence of rains, he is unable to run his ploughs, or, from the same cause, to scrape out his cotton in proper time, and consequently gets into the grass, he has necessarily to adopt such expedients as the emergency requires; and sometimes it is necessary to throw out of cultivation or abandon a part of the crop to save the balance.

The first of April is early enough to commence the planting of cotton, which is continued to the middle of May, and occasionally later. The only motive for planting in March is to get more forward with the work of the plantation, and put in a larger crop; and this is often done at the expense of a bad stand, or having to replant, which is apt to retard and derange all the operations of the planter.

Cotton, planted in well prepared land, after the ground has become sufficiently warm, comes up sooner, grows more rapidly, and is much less liable to be injured by the "sore-shins" or the plant-louse, than that which has been chilled by the cold winds and rains from getting above the ground too early in the season.

The practice of horizontal cultivation, or "circling" the rows, so as to keep them on a level on hilly and rolling land, was introduced by the late Mr. William Dunbar, of the Forest, in Adams county, (as Mr. Dunbar is known to have stated in conversation in the town of Washington, in 1810,) at the suggestion of Mr. Jefferson, of whom Mr. Dun-

bar was a correspondent for many years, when the former was President of the United States. Having observed, when in France, this economical manner of cultivating the mountain sides, Mr. Jefferson recommended it as well adapted to our broken lands. The practice was tardily adopted, and, like all similar innovations on established usages, met at first with its share of ridicule.

Many planters rely upon the eye alone in circling their lands, altering and correcting the rows in subsequent years as the direction of the rain water may show to be necessary. The most careful and judicious class, however, have their fields carefully staked out in the first instance by means of a triangular spirit-level, resting on a tripod for more convenient adjustment.

Gathering.—Like type-setting, cotton-picking is, and must still continue to be, performed by the fingers; but its rate has become as accelerated as if some new motive power was applied in the process. Fifty years since, 50 pounds a day was accounted fair work. Now the children double this; and 200 pounds is not unfrequently the average of the whole gang of hands, to say nothing of those who pick their 400 or 500 pounds of bolls [?]

The cotton is gathered from the bolls in the field in sacks, suspended over the neck and shoulder, and from which it is emptied from time to time into large baskets, made generally of white oak splints, and capable of holding about 100 or 150 pounds.

It is generally weighed at noon and at night, in the field, and the baskets emptied into a wagon, hauled to the gin-yard, and spread upon scaffolds, exposed to the sun, to dry. It is there picked over and threshed by the invalids, and such of the hands as are suited to this light employment.

When a long-continued drought prevails, after the frosts have checked the further growth, and the cotton becomes very dry in the field, it is not necessary to put it upon the scaffolds. If put up in bulk a little damp, it undergoes a heat by which the essential oil of the seed is discharged, imparting to the fibre a creamy color, highly prized by some purchasers, and which sometimes effects a good sale of a really inferior article. This is rather a dangerous experiment, however, to make on a large scale; for, if the heat rises too high, putrefaction and mildew will supervene, and serious damage will result.

In an average of ten years, in which observations have been recorded, the first cotton blooms made their appearance about the first of June, and the plant was killed by frost about the first of November

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INVESTIGATION OF THE COTTON FIBRE.

Sir: In accordance with the promise made in the last Report the investigation of the cotton fibre has been continued.

Many specimens have been submitted to thorough examination, under

every variety of circumstance, and under the influence of various chemical agents. As I had anticipated, it was soon found that the utility of this investigation would depend upon a complete study of the development of the fibre in the immature boll. For this purpose, arrangements were made to procure a sufficient supply of plants; but they unfortunately failed, owing to the extreme dry weather. It is to be hoped that a more successful attempt may be made the present year.

Meanwhile, there are several points of interest which should be made public at the present time in order that information may be gained from various quarters. In the first place, there seems to be good reason to believe that our cottons are mere varieties of one species. In the character of the fibre there appears to be a series of almost insensible gradations from the extreme of the long to that of the short staple.

In order to elucidate this interesting point, it is desirable to obtain specimens of transition varieties, if such are known; for instance, of short staple raised in the Sea Island region, or of "Sea Island," or long staple, raised in the Upland country.

As far as could be determined by the examination of the past year, it appears that the entire growth of the fibre takes place after the flowering of the plant, the unopened bud showing no signs of any such contents. It would seem, then, that the condition required for the growth of a long and uniform staple is a tolerably uniform supply of moisture, from the time of flowering up to the period of ripening.

The laws of the formation of the vegetable cell (for it is to be remembered that each fibre is but one long cell) are such that an interrupted supply of nutriment, causing a corresponding interruption in the growth will produce an irregular and somewhat knotty fibre, the inner deposites of the cell wall changing even the direction of their layers after these periods of temporary rest. Such, at least, seems to be the case with other plants, and there is good reason for presuming it to be the same with cotton.

It would be needless, at the present time, to enter into further details upon this point; but I throw out the suggestion for the purpose of obtaining exact information. This suggestion may be stated as follows: There is a strong probability that a long uniform staple requires an equable supply of moisture, rather above the annual average, from the time of flowering to that of ripening, or diminishing shortly before the latter period. Also, that a strong but somewhat irregular fibre may be expected when, during this same period, the supply of moisture is notably intermittent.

If these suppositions should prove to be correct, they would readily explain the limited extent of the Sea Island range, which may in part be determined by the influence of the Gulf stream upon our coast climate. They would also indicate that other regions would be more or less adapted to the production of this sort of staple, according to the peculiar climatic conditions.

An excess of moisture before the time of flowering would, according to this view, be rather unfavorable. In this connexion, I would mention the importance of exact meteorological observations throughout our cotton-growing country.

I have thus hastily sketched my ideas of this important subject, rather with a view to provoke investigation than with the purpose of giving the whole of the data and reasonings upon which I base my belief that the position is a correct one.

Before I conclude, another matter of some interest in the same connexion may be noticed: It is well known that in all parts of the world the bast liber, or inner bark of the malvaceous plants, yields a useful fibre of various degrees of fineness. There was no reason why this should not be true of the cotton plant, and it seemed rather remarkable that no notice of such use of its bark had ever been made.

At the close of the season, I made this matter the special subject of examination. I found the cells, forming the fibre, rather coarse, much more so than those of the species of Hibiscus and kindred plants, which, in the Sandwich Islands, yield a very fine and durable fibre. Still the cells of the cotton bark fibre may not always be as coarse as in the plants examined by me.

There is, however, another bar to their being extensively used: The wood of the cotton plant is tolerably hard, and the separation of its fibres, by mechanical means, is not so easy as in the case of other fibrous plants, such as hemp, in which the wood cells are short, relatively small in number, and easily separable from each other, and from the bast cells.

Again, if the plant is left to mature for the purpose of getting the cotton, the bark fibre becomes, by prolonged exposure, so much stained that it cannot be easily bleached, or at least not without injury to its strength.

Still, in the present scarcity of paper-making material, it may be well to look to the bark of the cotton plant as a partial supply for the commoner kinds of paper. Fermentation, or any of the known methods of separating the wood, might be employed. Except where labor is very cheap, stripping by hand could hardly be thought of as a profitable method.

Since these examinations were made, I learn that an intelligent gentleman at the South has thrown out a similar suggestion. Specimens forwarded by him bear out what is said above.

The utilization of this, as well as of the other innumerable sources of fibre, is a mere question of economy. The methods of preparation are simple and well known, and their application depends upon the cost of labor and material.

In conclusion, I would beg leave to repeat what I have said in the last Report, as to the supply of the specimens. Those who contribute for this purpose are aiding directly to advance national interests, alike important to the planter, the merchant, the manufacturer, and the consumer. In the next Report I hope to be able to present a systematic investigation of this subject, with some approach to completeness.

Yours, respectfully,

GEORGE C. SHAEFFER.

Hon. Charles Mason,

Commissioner of Patents.

CONDENSED CORRESPONDENCE.

Statement of J. H. Forman, *of Oak Bowery, Chambers county, Alabama.*

Cotton, which is our staple crop, is the only product here for transportation. It yields about 175 pounds of lint to the acre, costing about 7 cents per pound.

Statement of Anderson Gordon, *of Lewisburg, Conway county, Arkansas.*

Considerable cotton is raised here. Yield, about 1,000 pounds to the acre. Cost of transportation to New Orleans is $\frac{3}{4}$ to 1 cent a pound.

Statement of John Finlayson, *of Aucilla, Jefferson county, Florida.*

Cotton in this county is grown by almost every tiller of the soil, and is relied on as the chief source of income. Two descriptions of this staple are grown here, the "Long" and the "Short," the former on sea islands and maritime localities. The long-staple plant, however, is found to do well on some of our thinnest uplands, such as we call "pine," as far as sixty or more miles from salt water. A light, sandy soil is considered best suited for it; but, I think, generally the short staple is found to yield a better profit to the upland planter, especially if he cultivates good land. Our best short staple cotton fields are those we call "clay lands."

The production of clean cotton lint per acre depends mainly on the quality of the soil and seasons. The average for a term of ten years throughout the middle district of Florida, cannot, I think, be justly set down at more than 250 pounds. Our best lands, however, under propitious seasons, yield double this quantity, and even more, of clean merchantable cotton, whilst some of the poorer lands fall short of this average some 50 or more pounds. It is not an easy calculation to determine the cost of producing cotton fibre, but as the inquiry has been specially made, I have taken pains to obtain the nearest approximation. I am of opinion that the cost of production and conveyance to market is not short of \$4 50 per hundred pounds. This calculation demonstrates what all cotton planters know: that disastrous seasons, or low prices, leave but scanty profits, a continuation of which must inevitably drive them to the rearing of factories by which they can convert the raw material into yarn or cloth.

Statement of L. Rathbun, *of Bellevue, Bossier parish, Louisiana.*

The attention of the planters in this region is wholly devoted to the cultivation of cotton for market. The yield varies from 300 to 800 pounds of ginned cotton to the acre. The cost of transportation to New Orleans is about 25 cents per hundred pounds.

Statement of M. W. PHILIPS, *of Edwards' Depôt, Hinds county, Mississippi.*

Most of our cotton planters have an idea that close planting is detrimental. The usual distance between the rows of cotton is from 7 to 9 feet, with the stalks in the rows 3 feet apart. As early as 1842, I began to plant closer, and my experience since then has convinced me that my previously formed opinion was correct; and I am sustained, also, by the testimony of several reliable planters, who raise large crops, and have tested close planting. All planters know that the first bolls, which grow before the middle of July or first of August, are the best and principal part of the crop. Now, if we plant close, each stock will produce nearly as many of these early bolls as those planted further apart, and if they do not produce as many afterwards it is of comparatively little consequence. The crop will, therefore, be increased nearly in the ratio of the increase in the number of stalks obtained by close planting. Planting in rows, 4 feet apart, with the stalks about a foot apart, has been tried with success. In other instances, the rows were not more than 6 feet apart, often only 5 feet, and the stalks 18 or 20 inches distant from each other. The yield was far above the average.

Statement of JOSHUA HARRIS, *of Welche's Mills, Cabarras county, North Carolina.*

Cotton has yielded about an average this season. My own crop has turned out about 1,000 pounds containing the seed, or 250 pounds of ginned cotton, to the acre. The present price, at our nearest market, is from 8½ to 9 cents per pound. The stalk was small, but well loaded with bolls. I have seen nothing of the boll-worm, and but little rust, this year.

The time of planting cotton is from the 15th of April to the 5th of May. The ground should be prepared in March. It is thrown up in ridges, and then allowed to settle before planting.

Statement of ZENO P. WALKER, *of Egypt, Wharton county, Texas.*

After the ground is prepared for the plough, by cutting up and raking into rows the old stalks, and then burning them, it is laid off by running furrows 8 or 9 feet apart. On these furrows, beds are formed with a plough, and the entire surface of the ground ploughed. An opening is made in the top of each bed with a coulter, into which the seed is strewed continuously, and then covered by turning two furrows over them. When the cotton is up, and three leaves appear on the young plants, they are thinned out with a hoe, leaving the others standing at distances of 36 inches. Afterwards, another thinning takes place, as it would be unsafe at first to reduce the plants to one in each place, they being at that age tender and liable to be injured by north winds. The cultivation is continued with the plough and hoe until "corn picking" commences.

The highest yield of cotton on our best alluvial and cane lands is three bales to the acre, of 500 pounds each, and could all the cotton be saved, the average in favorable seasons would not fall short of this quantity. But high winds, heavy-beating or long-continued rains, and drought, are all very injurious, and render the cotton crop the most precarious raised by us. The average yield is a bale and a half to the acre.

FLAX.

CONDENSED CORRESPONDENCE.

Statement of DR. HENRY M. PRICE, *of Nicholas Court House, Virginia.*

Considerable quantities of flax are raised here, both for the fibre and seed. The staple is usually manufactured at home into coarse bagging and linen.

Statement of WILLIAM ALVERSON, *of Beloit, Rock county, Wisconsin.*

Flax is a good crop. The yield of seed is about 10 bushels to the acre. Value, $1 a bushel. The stalk is worth from $4 to $7 a ton for making paper. It is cut with a cradle, and bound into bundles, to be sent to the threshing mill. It then goes to the "picking machine," where it is prepared for the paper mill.

HEMP.

CONDENSED CORRESPONDENCE.

Statement of SAMUEL D. MARTIN, *near Pine Grove, Clarke county, Kentucky.*

The yield of hemp is from 500 to 1,000 pounds to the acre. This year it is worth $160 a ton. The price is so uncertain and fluctuating that many persons have stopped raising it.

Statement of H. L. BROWN, *of Fayette, Howard county, Missouri.*

Hemp is considered the most profitable crop raised in this State. Some farmers of my acquaintance have tried a method of culture somewhat different from that commonly adopted, and with good success.

Instead of breaking up the field in the spring, on the old method, they sow the seed at once, and cover with a small plough, in the usual manner of putting in the seed. Thus one ploughing is saved. The crop withstands the drought better than those cultivated in the ordinary way, and the hemp is of superior quality.

GRASS, HAY, AND OTHER FODDER.

COUCH OR PHIN GRASS.

BY C. E. POTTER, OF MANCHESTER, HILLSBOROUGH COUNTY, NEW HAMPSHIRE.

Couch Grass (*Triticum repens*) is known in the valley of the Merrimack and in other parts of this State by the name of "Witch Grass." It was first brought into notice under that appellation as worthy of cultivation by the committee on root and grass crops of the New Hampshire State Agricultural Society, in 1853. In the vicinity of Concord it is called "Phin Grass," or "Fin Grass," after Phineas Virgen, on whose land it was first cultivated in that town. Its proper name, I think, should be "Couch Grass." It is a stocky, hardy, sweet plant, and if properly cut and cured, it will command a higher price in the market where it is known than Herd's-grass (Timothy.) In addition to this, it has other qualities not common to most other grasses. It can be propagated from the root as well as from seed, and will accommodate itself to poor as well as to rich soil—to dry land as well as to that which is moist. It grows most luxuriantly in meadows as well as in valleys, and does not refuse a fair yield upon pine plains, banks of gravel, nor sandy knolls. Notwithstanding these advantages it has its drawbacks. Once in the soil, it is there for a lifetime. It cares little for plough, harrow, or hoe. For this reason it is considered a curse in a field for tillage. It will not be kept under by cultivation. On this account it is invaluable. When once down, if a top-dressing be applied, the soil need not be touched with plough nor hoe for twenty-five years. If the crop fails in spots upon knolls, or other places, apply a heavy harrow, an extra sprinkling of manure, a liberal supply of couch seed, harrow the ground once, and the work is done. A field cultivated in this manner will produce a greater profit in hay than if kept in any other grass in the usual way.

It may appear singular that one should recommend the cultivation of a grass that botanists pronounce a noxious weed, both in gardens and in fields; but experience shows that this useful class of men know little of its value as food for stock. Fifty years ago, this grass upon the "intervals" of the Merrimack was considered a curse by farmers in general; but for the last twenty-five years it has been regarded of equal, if not greater value, than herd's-grass (Timothy) for hay. The better its qualities are known, and its adaptation to various soils, and its appropriate cultivation studied, the more reliable it becomes.

After giving particular attention to this grass, its history and characteristics, for more than thirty years, I have come to the conclusion that it is heavier, according to its bulk, than almost any other kind of hay, and will produce more weight of fodder upon a given space of ground, without lodging or rotting, than any other grass in common cultivation. It stands up tall and straight, almost like rye. Again, an equal number of pounds of this plant will make a greater amount of hay. In proof of this, I subjoin a table by John Willis, from the "Massachusetts Agricultural Repository," for 1823:

	Pounds when dried.
100 pounds of green White Clover Grass	29
100 pounds of Red Clover	25
100 pounds of Herd's-grass, (Timothy,)	39
100 pounds of Fresh Meadow	44
100 pounds of English Rowen, (second crop,)	19
100 pounds of Salt Grass	60
100 pounds of Corn stalks	25
100 pounds of Spiked Oat Grass	50
100 pounds of Red-top, (herd's grass,)	46
100 pounds of Rhode Island Grass	40
100 pounds of Couch Grass	48
100 pounds of Marsh Black Grass	38

From the above table, it will be seen that in this particular "Phin Grass" takes the lead among meadow grass, red-top, and herd's-grass, and in fact many other grasses commonly grown, salt-marsh grass and spiked oat grass alone excepted.

CONDENSED CORRESPONDENCE.

Statement of J. H. FORMAN, *of Oak Bowery, Chambers county, Alabama.*

Very little attention is paid here to the grasses, as we have an indigenous one known as the "Crab" or "Crop-grass," which answers every purpose for hay, grazing, or covering for fallow, and is a good fertilizer. It never requires seeding, and brings a fair crop spontaneously where many of the Northern grasses would fail to grow.

Statement of ELI GOODRICH, *of Branford, New Haven county, Connecticut.*

The best time for sowing Timothy is in the fall, either alone or with rye. If alone, it would be well to sow as early as the middle of August. Four quarts of seed are sufficient to sow on an acre. Clover,

sow in March, on a light snow if possible, about 3 quarts to the acre. *Yield of* hay from half a ton to 3 tons an acre.

Statement of JOEL CRAWFORD, *of Blakeley, Early county, Georgia.*

The "Alfalfa," or Chilian clover seed, which I received from the Patent Office last year was sown in October, 1853. It quickly came up, and has since born the cold of winter and the heat of summer so well as to promise great benefits to those farmers who can be taught to believe that grass of any kind was made for anything but to infest fields of cotton or corn. In all other countries grass is deemed a crop of the first importance; but in this cotton-growing region, a mere pest. I shall allow my little patch of alfalfa to stand, and the seed to fall, in order that I may know in what diversity of luxuriance the plant will mature.

We make little or no hay, though our "Crab," or, more properly, "Crop-grass," "Crow's-foot," and other native plants grow in great abundance, and would make an excellent article. The blades of Indian corn, stripped off in a green and succulent state and properly cured, make an excellent substitute for Timothy or clover hay.

Statement of E. BABCOCK, *of Riley, McHenry county, Illinois.*

Of grasses, Timothy is mostly raised with us, but more for its seed than for hay. The seed always finds a ready market at a fair remunerating price. The yield of seed is usually from 7 to 10 bushels to the acre, worth from $2 to $2 50 per bushel; and the hay is worth from $2 to $3 per ton after the seed is off. The yield of hay is about 2 tons to the acre.

Clover, although not much cultivated, proves a profitable crop to our farmers, often giving two crops a year from the same land.

Statement of MARTIN MONDY, *of Vermilion county, Illinois.*

The principal grass here is Timothy. It yields, on an average, about 2 tons to the acre. Value, about $5 per ton.

Millet, a new grass with us, produces well and is excellent for stock. We sow it every spring. The ground is broken up early in April and pulverized with a harrow. A half bushel of seed is then sown to each acre and harrowed in. It is cradled like oats when the seed is ripe. It grows here to the height of 6 or 7 feet, produces about 6 tons to the acre, and is very nutritious.

Statement of JOSEPH C. ORTH, *of McCleary's Bluff, Wabash county, Illinois.*

Grass, for hay, is considerably cultivated here. The yield is generally about 2 tons to the acre. The present price is from $6 to $8 per ton. Cost of harvesting about $2 per ton.

Statement of H. F. Moore, *of Big Mound, Lee county, Iowa.*

Timothy is our principal grass for hay. I prefer, however, to sow it in March, mixed with clover seed in the proportion of two parts of the former to one part of the latter, at the rate of 5 quarts to the acre. Average yield, 2 tons of hay to the acre without, or 9 tons with, manure, valued at $4 50 per ton.

Statement of J. W. Raynolds, *of Newbern, Marion county, Iowa.*

Grasses are easily started on our prairie lands by feeding down the natural growth closely a few years, and harrowing well in March, then sowing the seed and harrowing again. The native grasses serve a valuable purpose, furnishing pasturage while they last, but die as soon as the first frosts come. By taking care, however, not to allow the ground to be turned over till June, pretty good feed continues till the hard frosts appear. These wild grasses also make good hay for keeping young cattle. On rich uplands, the yield is perhaps half a ton to the acre. On bottom lands, a sort of blue-stem grass grows, which yields 2 or more tons an acre.

Statement of Samuel D. Martin, *near Pine Grove, Clarke county, Kentucky.*

The grass crop of this region is probably worth more than any other cultivated, if we include the clovers.

Our best grass is the "Kentucky Blue-grass" (*Poa pratensis.*) It forms a fine, thick sod, affords much grazing, and continues green all winter, so that stock will keep fat upon it throughout the year. The blades grow all summer. The seeds are abundant and ripen early.

The seed of this grass was brought from England by a family which accompanied Boone to Boonesborough, in the first settlement of Kentucky, and planted in a garden at that place. It became troublesome, and was dug up and thrown over the fence. But it could not be so easily rooted out, and in time spread over the State. It is the "Spear-grass" of England.

Timothy is used here, mixed with clover, in seeding down ground which has been in cultivation. It makes fine grazing, and when cut, and well cured, excellent hay, for which purpose it is more used than any other grass by our farmers.

Some years ago, I received from a gentleman in Virginia a small bag of grass seed, which I sowed. It grows in bunches like the orchard grass, and is somewhat similar to it in appearance, but its seed is more like that of the ray-grass; it is a native of Virginia, and is also found growing wild in Kentucky. It keeps green all winter, and is eaten with avidity by stock. It also starts early in the spring. I consider it about as good as the orchard grass.

In our mountains there is a great variety of pea plants, which afford much grazing; but, being mostly annuals, they give way, after a few years, to grasses.

There are also some native grasses here. A kind of wild rye was very abundant in this neighborhood when first settled. It is green all winter, and affords some grazing at that season. I have known of no attempts to increase it by sowing; but it still keeps possession of some spots. If cultivated, I have no doubt it would furnish fine winter pasture for young stock, but the yield would be so much less than that of a pasture of blue-grass, reserved for that season, that no one has ever made the experiment.

Another native grass was found by the first settlers here. It is white clover, nearly as large as red clover, and was named "Buffalo clover." I do not know that any one has ever attempted to propagate it.

Statement of FRANCIS FULLER, *of Winthrop, Kennebec county, Maine.*

The grasses most cultivated with us are "Herd's-grass," (Timothy,) red-top, and clover. They are generally sown in the spring with wheat or other grain. The average yield of hay is a ton to the acre.

Statement of WALTER W. W. BOWIE, *of Governor's Bridge, Anne Arundel county, Maryland.*

I sowed some "Iverson grass" seed the last of October, upon a kind soil, unmanured. It came up at once and has grown well. It is now, (March 17,) at least 3 inches high, and has been green all winter. It bids fair to be one of the most valuable grasses ever sown in Maryland. At first, I doubted most that was said of it, but I now feel sure that it will surpass all that its discoverer has said or written about it.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Of late years, the only grasses used in laying down our meadows are clover and Timothy, which are sown in about equal quantities, say about 4 quarts of each to the acre. Formerly our practice was to sow both kinds together in March. But it has been found that when sown at that season, the young Timothy does not get sufficiently rooted by the next August to withstand the drought which almost invariably prevails in that month. To remedy this difficulty, the plan is now pretty generally adopted of sowing the Timothy seed by itself, in September, either with, or soon after the wheat, and then the clover seed upon the same land the next March.

It is here considered a very bad plan to allow stock, especially sheep, to run upon new-sown meadows; for they destroy much of the clover by biting it off below the crown of the roots. There is most danger of this early in the spring, when the roots have been partly raised above the surface by the frost. And I am fully satisfied that meadows would do much better if they never were pastured at all. Whenever a meadow is left without pasturing during the remainder of the season after mowing, a considerable amount of new grass always springs up. This should be allowed to remain, both for enriching the

soil, and especially to protect the young grass as it starts up early in the next spring. Meadows thus treated get a good start long before any grass can be seen on those which have been fed down the preceding autumn. Besides, on the latter, a June drought will almost cut off the crop of hay, while meadows in similar condition, but not fall-fed, will produce 2 tons to the acre.

Low lands, if they do not get overrun with foul vegetation, will sometimes produce good crops of grass for eight or ten years in succession; but high lands do not produce well after the third or fourth year from the time of seeding. By a regular alternation of grain and grass, we get better crops of both; and I believe this system, applied to both high and low lands, to be better than that of constantly employing low grounds for hay, and high grounds for grain.

Hay is worth here from $8 to $10 a ton. It costs about $2 a ton to cut and stack it. Mowing machines are now used on most of our fields that are smooth enough to admit of their use. They work exceedingly well, cutting the grass clean, and leaving it not like the scythe, in swaths, but nicely spread over the ground.

Statement of Solyman G. Hamlin, *of West Glenville, Schenectady county, New York.*

Red clover, both large and small, and "Timothy" are the grasses generally cultivated among us, either for hay or pasture. The large kind of clover is generally preferred, as it accords more with Timothy in maturing, and produces a greater quantity of pasture than the small variety. Timothy is thought to be decidedly the best for horses and commands a better price in market, but clover is the best for cattle and sheep.

In laying down land to grass the seed is generally mixed 4 quarts of each per acre, when sown together; and 6 quarts of Timothy, or 8 quarts of clover to the acre, when sown separately. I think the best time to sow Timothy is in the fall with wheat, before it has had its last harrowing, or previous to rolling. Clover is generally sown in the spring with wheat, barley, or oats. Two tons per acre may be considered the fair average of the hay crop, worth, from $10 to $15 per ton.

Plaster is the cheapest and surest fertilizer for pastures and meadows, especially on light, sandy soil. On moist land we find less benefit from its application. It can readily be obtained at the mills in this vicinity at about $4 per ton.

Grass should be cut at the time the blossoms are falling, or before the nutriment has passed from the stem.

Statement of D. C. M. Evans, *of Scio, Harrison county, Ohio.*

Clover is sown for pasture, hay, and seed, and for renovating the land. When intended for seed, the first crop is mown for hay, which will average 2 tons to the acre. This crop is cut about the 15th of June. The seed is gathered from the second crop, which is cut in

September, and yields from 2 to 2½ bushels to the acre. Clover, of all grasses, makes the best pasture for horses, but is not so good for sheep. The price of clover seed at present is $9 per bushel.

Timothy is sown for the same purposes as clover, except as a fertilizer. The average crop of seed is from 5 to 7 bushels to the acre. Price of seed, $3 25 per bushel. The hay is considered superior to any other. Present price of hay, $10 per ton.

Statement of THOMAS F. HICKS, *of Jelloway, Knox county, Ohio.*

Clover should be sown on wheat land in the spring. Some prefer sowing on the snow in March, but I think about the 1st of April is the best time. If sown too early it is liable to be injured by the frost. A mixture of clover seed with Timothy makes the most reliable pasture. Two bushels, one of each, will sow 10 acres.

For hay, Timothy is preferred to clover, as it yields the heaviest and cures the easiest; but where land is too dry for the profitable culture of this grass, clover is used from necessity.

Statement of LEWIS BAILEY, *of Friendship, Fairfax county, Virginia.*

On the 1st of October last, I sowed a peck of the "Iverson grass" seed on one-fourth of an acre, a part broadcast and the remainder in drills. In about fifteen days, it came up and made a remarkable growth, even during the winter months. At the present time, (April 24th,) it stands fully 10 inches in height, far in advance of the lucerne, orchard grass, and red clover, which are growing near by.

The recommendation of this grass by Mr. Iverson, so far as my experience goes, is fully realized, and I have no doubt but it will prove to be a standard crop and a valuable addition.

Statement of HENRY M. PRICE, *of Nicholas Court House, Virginia.*

A considerable portion of this county consists of fine meadows, though all of our land is well adapted to grass. The meadows yield about a ton of hay to the acre, worth $10 per ton, when fed out on the farm. The cost of cultivating hay is about $1 25 a ton. Good grass land is worth from $5 to $10 per acre.

The variety of forage best adapted for sheep-grazing on mountain lands is the "Randall," a tall coarse grass, growing freely on a rocky soil to a height of 6 feet, remaining green, and affording fine herbage throughout the winter.

THE JAPAN PEA.

CONDENSED CORRESPONDENCE.

Statement of JOHN DANFORTH, *of New London, New London county, Connecticut.*

Last May, I planted four Japan peas, from which I raised, in number, thirteen hundred and seventy-six, measuring about a pint.

As this plant appears to be well adapted to our climate, I have reserved my peas for planting next year.

Statement of T. VICTOR, *of the city and county of New York.*

In the latter part of April last, I planted six Japan peas, from which, notwithstanding the unfavorableness of the season, I raised seven hundred and twenty-six in number, or about one hundred and twenty to one.

Statement of S. D. PRATT, *of Pompey, Onondaga county, New York.*

The Japan peas sent to me last spring, eight in number, were planted on the 3d day of June. The ground was made mellow with a hoe, and the peas planted about one foot apart, like garden beans. Six of them came up within a week, and presented a thrifty, vigorous appearance. The season was the dryest within the recollection of our oldest inhabitants; and when the garden plants were drooping and wilting from excessive drought, they retained a fresh, healthy appearance.

These peas were planted so late that they did not mature before the last of October, after several frosts, and two or three of the plants were broken down by accident; but with all these things against me, I harvested about half a pint, which will be distributed among farmers in this vicinity who may be desirous to cultivate them. The plant in its growth was not troubled with insects, and the downy covering of the pods will prevent the fly or bug from inserting its ovipositor into the green pea, and leaving there a rudimentary bug to revel on the farmer's toil and blast his hopes. The pea should be planted at least two feet apart, about the time of corn-planting. That they can be successfully cultivated in Central New York there is no doubt.

THE OREGON PEA.

The following statement of the result of a trial of this pea, by the editor of the Clarksville "Cotton Planter," is condensed from the "American Farmer," which confirms, in a degree, what was published concerning it in the Agricultural Report of the Patent Office for 1853:

This is not an early pea, as the accounts represent. The stalk grows

very large before it blossoms, and these do not all appear simultaneously either, but the first crop and others put forth in succession, continuing so throughout the summer, so that the same stalk contains dried peas and unopened blossoms. We should advise, then, that it be planted early, if a full crop of seed is desired. If hay is the object, later planting will do, for the rapidity and luxuriance of its growth exceeds anything else we ever saw. We did not see any plant as "large as a tobacco hogshead," but from the size which they attained in very moderate soil, we do not think it at all remarkable that they should reach those dimensions in the fertile valleys and warm climate of the Mississippi. The description is entirely accurate with regard to its growth, which resembles the cotton plant very closely. The branches shoot out from the main stem in a similar manner, which are divided and subdivided again and again, and filled with large, luxuriant leaves, that give the plant a very rich and beautiful appearance. The stalk is brittle, and supporting so large and heavy a top, is liable to be broken by the winds and rains which occur among us every summer; indeed, all that we saw were broken in this way last summer; but their growth is not perceptibly retarded by such an accident. Unless broken entirely off, the branches turn up, and the plant continues to flourish as luxuriantly and as richly as ever. In truth, it is doubted by some whether the breaking is not an advantage; for it is thus enabled to spread more, and the matting of the branches, from contiguous plants, forms a complete protection to the soil.

The account given of its heavy yield we are fully prepared to believe. The vines were loaded with clusters of pods, which ripened successively, and were succeeded by fresh crops, so that the result might reach an almost indefinite amount. We heard many speak of it, and all agreed that the yield was greater than from any other plant grown in this section. There is little difficulty in gathering them, we think. The pods should be pulled off while wet with dew, and when dried they either burst spontaneously or are threshed out with the greatest ease.

As an article of human diet, we think it is worthless. We tried it, and knew others to try it, but the impression was that it is of no value. For horses and cattle, we think it must prove, if properly appreciated, invaluable for this section. They devour it either green or dried with the greatest avidity. We saw them several times leave oats to eat the leaves. The feature of most value in this connexion is, that it cures with the leaf on. At different stages of its growth, before and after bearing, plants of it were cut and heaped up to ascertain if the leaf would drop in curing, but it did not, and no shaking nor handling could make it drop. This feature supplies a desideratum. It offers the farmer a means by which he can lengthen out his supply of fodder to any extent almost any time during the summer; when he desires to have an additional supply of hay, he may drill a lot with the Oregon pea, cultivate and cure it, and it will furnish five times as much fodder for the extent of surface as anything else he can plant.

As an improver of the soil, it must be very valuable. The vast amount of the finest pea haulms protect the soil during the heat of sum-

mer, and turned in before frost with a heavy double plough, would necessarily contribute vastly to enrich it.

As to the growth on poor and rich land, the stalk, no doubt, grows larger on that which is rich, but the difference is nothing like so great as we should imagine. Those planted contiguously on poor red land and gray soil presented no great difference. At any rate, it will grow longer and yield more on poor soil, by nine or ten fold, than any other pea we know. It will grow large on any land, and furnishes a fine supply of vegetable matter for the soil.

Upon the whole, then, we are inclined to esteem the Oregon pea a valuable adjunct to the farmers in this section. As a heavy producer, it is unsurpassed; for the immense yield of tops it is not equalled by anything else we ever saw. As a hay crop, it is invaluable, by reason of the fact that it cures up with the leaf clinging to the stem, and is eagerly devoured by cattle and horses. We know that many persons, who expected nothing less than a miracle from it, were disappointed; but we are firmly convinced by our observations that it will be valuable to the farmers of this section if properly used.

CONDENSED CORRESPONDENCE.

Statement of JOHN DANFORTH, *of New London, New London county, Connecticut.*

Last May, I planted in my garden a small parcel of Oregon peas, which I obtained from the Patent Office. They fully matured, and stood our climate well. It is my belief that these peas will make excellent feed for cattle, sheep, and hogs. I have on hand from my little crop about a pint of peas, which I have saved for seed another year.

Statement of FALKLAND N. MARTIN, *of Clifton, Jefferson county, Missouri.*

Last spring, I received from the Patent office and planted somewhat less than half a tea-spoonful of Oregon peas. They were carefully cultivated according to the directions given by Mr. A. B. Rozell, in the last Agricultural Report. The crop was much injured by the drought, the stalks attaining the height of only 2½ or 3 feet. I gathered half a bushel of well matured peas, and left about as many more green ones on the stalks, which were destroyed by the frost. The plants withstood the drought better than any other vegetable growing on my farm. The only unfavorable peculiarity which I noticed was the readiness with which the ripe pods burst open when exposed to the sun. But this may not be the case in less hot and dry seasons. If the productiveness of this plant should prove but half equal to what it has been in Tennessee, I have no doubt but in a few years it will, in a great measure, supersede the use of clover, both as a fertilizer and for hogs.

TURNIPS.

THEIR HISTORY AND CULTURE.

The cultivation of the turnip as an esculent, both for animals and man, is of great antiquity. It was lauded by Columella, and even in his time the ancient Gauls fed them in winter to their cattle. The Romans were so well skilled in its culture that, according to Pliny, he raised turnip roots weighing 40 pounds. Amatus speaks of them as weighing 50 pounds, and Matthiolus of many exceeding that weight, some of them even approaching 100 pounds each; but in Italy, at the present day, it is accounted an extraordinary turnip that will weigh 4 pounds. These statements by the ancients are regarded by many as exaggerations, yet, when we consider that our own California has produced turnips weighing 45 pounds, their assertions may be received as correct. The greatest weight on record in England is 36 pounds. At Stow, in Gloucestershire, a farmer produced four turnips weighing 112 pounds, and offered to produce from a small given space of ground 80 turnips which should weigh a ton. A square perch, (272¼ square feet,) drilled in rows three feet apart, in Ireland, has been found to produce 84 turnip roots, weighing 840 pounds, which is about 60 tons to the statute acre. Two turnips out of the lot weighed 32 pounds each, one of them measuring 3⅝ feet in circumference. But whoever calculates on such a yield as above will find himself disappointed. A more moderate estimate would be as follows: An acre contains 160 square rods, or 43,560 feet. Now, if we estimate one turnip weighing 2 pounds to a square foot, we shall have 43 tons upon that acre. But even here we must make considerable allowance for vacant spaces, deficient in roots from waste and other causes.

Whatever skill the ancients might have possessed in the culture of turnips, it cannot be a matter of surprise that it should have been neglected in the confusion consequent upon the fall of the Roman empire. Although it was practised in Holland and Germany as far back as we have any records of the agriculture of those countries, it does not seem to have been introduced into Britain for the purpose of feeding stock till about the middle of the seventeenth century. Sir Richard Weston, in his "Discourse of Husbandrie used in Brabant and Flanders," 1645, affirms that turnips were then cultivated for feeding kine in many parts of England. Worlidge, who wrote in 1668, says, "flies are the greatest enemy to turnips." They are also mentioned in Houghton's "Collection of papers" as food for sheep in 1684; and Ray, in 1686, informs us that they are sown everywhere, in fields as well as in gardens, for the sake of their roots. Again, Lisle says, in 1707, that the Newtown men, who hoed his turnips, had made it their business for many years. And lastly, Mortimer, who wrote at the beginning of last century, states, that "turnips are of a very great advantage to be sown in fields as food for cattle in winter." Hence the assertion that the culture of turnips was first introduced into England by Lord Townshend, in the year 1730, cannot be true; nor did he the way, even, into Norfolk itself, as has been supposed; for L sle

whose observations in agriculture were made between the years 1693 and 1722, speaks of conversing with a Norfolk gentleman about the turnip husbandry of that county, particularly on a distemper called the "hanbery." The improvement of this species of culture in England, however, undoubtedly was gradual, but was not well understood before the beginning of the last century; nor did it arrive at its present perfection until the analysis of the entire plant by the Royal Agricultural Society of England, in 1846.

The introduction of the turnip into the British North American colonies probably dates back to the early periods of their settlements. They were only cultivated as esculents for the table, prior to the general adoption of the common potato, in about the year 1750, for which they had previously been used as a substitute. They were plentiful about Philadelphia in 1707; and Douglass says, in his "British Settlements in North America," published in 1750: "Our best New England turnips are from new lands southeast from Boston." Turnips were also grown in perfection in South Carolina, in 1779. This crop, however, was not much cultivated for feeding stock in the United States before the early part of the present century. The common flat turnip was somewhat extensively raised as a field crop, in Massachusetts and New York, as early as 1817. At about this period an acre of Swedish turnips was cultivated on Bick's prairie, in Illinois.

Selection and Preparation of the Soil.—Turnips delight in a loose soil, on new land, in which they are raised to the greatest perfection and with the least risk. Sandy loams, in good heart, are most favorable to their growth, though they would thrive in strong loams if they are not wet; but the crops in the latter will often be rank in their taste, and run to flower at too early a period in spring. It is useless, however, to attempt to raise them on a stiff clayey soil, or one that is wet, unless they are perfectly pulverized, drained, and rendered fertile, if necessary, by the addition of manure. It has been proved by long experience in this country that old sod, well rotted, or newly-cleared land, recently burnt over, produces the largest and the finest flavored roots. Those who do not possess lands of this description, but have a few sheep, can raise a small patch of the flat turnips by "folding" or "yarding," the ground at night for two or three months previous to sowing the seed. But those who design to enter into field culture on a large scale must render their land as rich as possible by adding manure, especially if the crop is to be removed from the ground.

A method recently introduced into Virginia of sowing turnips among Indian corn in the hills, after the last hoeing or working, has been attended with good results, and might be adopted with advantage in other States where the crop is liable to suffer from strong heats or drought. The corn not only screens the turnips from the sun, in the early stages of their growth, but protects them from beetles and flies. By the time the corn is removed from the field, they will have the full benefit of the sun, and will continue to grow until they are checked by frost.

In the cultivation of turnips there are four things which ought to be carefully attended to: First, to have the ground in a finely pulverized state. This may be accomplished in a cold climate by deep and

rough ploughing just before the freezing of the ground; second, to force forward the young plants into rough leaf in order to secure them from the attack of the fly. This is best effected by drilling or sowing the seed with guano, bonedust, super-phosphate of lime, or other stimulating manure, or by soaking the seed in a strong solution of concentrated chemical manures; third, to have the ground clean and free from weeds before the seeds are sown, and watching the growth of weeds afterwards and cutting them off before they choke the crop; fourth, to keep the ground constantly loose and open about the plants by stirring it between them in dry weather. The oftener the ground is stirred the better, provided the roots of the plants are not disturbed.

In preparing a field for a new crop of turnips, unless it be folded or burnt land, it should be ploughed and cross-ploughed after harvest in the fall. A good coating of barnyard or other manure should be turned under, which may not necessarily be rotted, as it will become thoroughly decomposed and incorporated with the soil at the time of sowing the following year. If barnyard or other manure cannot conveniently be had, its place may be supplied by ploughing under a green crop of clover, luzerne, spurry, or buckwheat the summer before, and let the land lie in a fallow during the fall. About the beginning of summer the next year another ploughing may be given, with repeated harrowings, in order to destroy the weeds and pulverize the soil. Just previous to sowing broadcast the ground may receive a dressing of well-rotted compost or barnyard manure, which should immediately be ploughed in; but if guano, bonedust, or super-phosphate of lime be used, it is better to sow in drills, as one-half the quantity will suffice. If the land be dry, let it be ploughed quite flat; but if wet and springy, form it into ridges or beds sufficiently high to keep off the water; for after the last manuring, plough it into four-furrow ridges and drill on the top of each. Where land is high and labor cheap, it is the most profitable to sow in drills on the top of ridglets formed by the plough; allow the plants to remain where sown, and thinning them out at proper intervals the first time of hoeing. When the ground is ready, commence opening the drills with the plough, making the furrows from 20 to 25 inches apart from centre to centre, according to the strength of the land. Then scatter the manure uniformly along the drills and cover it with the plough by splitting the furrow-slices in the middle, turning one-half of the earth each way so that the manure may lie in the centre of the drill when closed. An acre of ground will ordinarily require from 250 to 400 pounds of guano; 15 to 20 bushels of bonedust; 4 or 5 bushels of bones dissolved in 100 pounds of sulphuric acid; 200 to 250 pounds of super-phosphate of lime; 20 to 30 bushels of wood ashes; or from 500 to 1,000 bushels of fine, well-rotted barnyard manure.

When the drills are thus completed, the seed may be sown with a drilling machine, if one can be had; if not, and the quantity of ground be small, a little furrow may be made with a hoe or pointed stick along the top of the drill, about an inch and a half or two inches deep; and the sowing may be done by means of a bottle having a quill inserted in the cork, with which the seed may be deposited tolerably even and with considerable rapidity. The seed is best covered by

running a light roller over the top of the drills; or in a small way it may be done by drawing over them the back of a shovel or spade loaded with a small weight.

In parts of the country where land is cheap and labor high, it is more economical to sow turnips broadcast, and cover the seeds by means of a brush-harrow or rake. The ground in this case should be ploughed in the fall, re-ploughed the following summer, and finely pulverized by harrowing previous to sowing the seed. When newly burnt land is employed, the ground should first be cleared of all logs, brands, and loose stones. Then, without any further preparation, the seed may be sown broadcast, and the ground immediately after run over with a heavy iron-toothed harrow, which should be followed by an iron rake or hoe, in order more perfectly to cover the seed around stumps and large stones or other places where the harrow may not have done its work.

Period of Sowing.—The period of sowing varies according to the varieties, the climate, and the season in which they are intended to be consumed. Those designed for summer use should be sown early in the spring, but the main sowings of the common flat, tankard or globe varieties, may be sown either broadcast or in drills, as above, in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Michigan, Wisconsin, Iowa, Minnesota, Kansas, Nebraska, Washington Territory, and Oregon, from the 15th of July to the 1st of August; in New Jersey, Pennsylvania, Delaware, Maryland, Virginia, Ohio, Kentucky, Indiana, Illinois, and Missouri, from the 1st to the 20th of August; in North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi, Arkansas, Louisiana, Texas, New Mexico, Utah, and California, from the 1st of October to the last of November; and in the more southern States any time during the winter.

The varieties known as "Swedes," or "Ruta-bagas," may be sown in drills or ridges from 20 to 25 inches apart, and a foot asunder along the drills, in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Michigan, Wisconsin, Iowa, Minnesota, Kansas, Nebraska, Washington Territory, and Oregon, from the middle of June till the 20th of July; in New Jersey, Pennsylvania, Delaware, Maryland, Virginia, Ohio, Kentucky, Indiana, Illinois, and Missouri, from the 20th of July to the 1st of August; in North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi, Arkansas, Louisiana, Texas, New Mexico, Utah, and California, from the 1st of August to the 20th of September; and even later in the more southern States.

Choice of Seed.—New seed should always be sown in preference to old; and it is thought to do better if brought from a cold climate to a warmer one, or changed as often as every other year, as otherwise it is believed to degenerate, and the quality of the roots become impaired. From the cold moist climate of Great Britain, and the comparatively small number of insects which attack the stalks and leaves of this plant, the cultivators of that country can raise turnip seed of a far superior quality and at a cheaper rate than can be done in any part of the United States. Therefore it would be more economical for our farmers to import

their seed rather than attempt to cultivate it, besides the advantage of raising a better crop. Should they produce their own seed they may select turnips of a large size, of a perfect form, and plant them in rows three feet apart, and about a foot asunder along each row, as early in the spring as the season will admit, taking care to keep them free from weeds and predatory birds until matured. They will ripen their seeds in the Middle and Northern States from June till August, which, in general, will be sufficiently early to be sown for the autumn crop. No two varieties must be allowed to grow together, nor in the neighborhood of any of the cabbage or brassica tribes, as their pollen is liable to mix and produce worthless seeds. When sufficiently ripe the seeds stalks may be cut, well dried in the sun, the seeds beaten out, and stored in a dry airy place, until used.

Quantity of Seed and Preparation for Sowing.—The quantity of seed recommended varies according to the condition of the soil and the variety employed—say from 1½ to 6 pounds to the acre if sown broadcast, or half as much if sown in drills. When sown broadcast it may be more regularly distributed by mixing it with a half bushel of damp saw-dust, or other materials, to the acre, in order to increase its bulk. Whether sown broadcast or in drills, the growth of the plants may be greatly accelerated, and sooner carried forward beyond the depredations of the fly, by soaking the seeds for thirty-six hours in a solution of one quart of the best Peruvian guano to 30 gallons of water.

If the first sowing should not succeed, and the failure be fully ascertained before the weeds have become too strong to be eradicated with the rough harrow, let the ground be re-harrowed and sown the second time; but if the weeds have got fast hold of the soil, or if the season be too moist to prepare it by harrowing alone, re-plough, harrow, sow, and cover as before.

Culture and Trimming out the Plants.—If the ground at the time of sowing be in a warm moist condition, and an active stimulating manure be applied, the young plants, in general, will make their appearance in six or eight days, according to the state of the weather and the quality of the soil. It may be longer, however, before they appear, particularly if the manure is not quick in its action, and the season should be adverse to vegetation.

As soon as the second or rough leaves of the plants are about two inches high, a horse or hand-hoeing is to be performed between the ridgelets to cut up the weeds; the hand-hoe may shortly afterwards be introduced to thin out the plants, leaving them at intervals of from eight to twelve inches apart in the drills, or if sown broadcast, about the same distance from each other. No fixed rule beyond the first thinning can be laid down for the after cultivation of the turnip, as so much must depend on the state of the weather and the size of the plants when fully grown. In a fortnight or three weeks after the first thinning has been done, the laborer must again pass through the field in dry weather, (for no operation in the turnip crop should be attempted in wet weather,) and remove such weeds as may have sprung up in the interval, trimming the earth round each plant, and at the same time cutting out any superfluous ones which had escaped his previous notice; for if left too thick, or if there should be two or more together,

they will grow up slender and weak, and not swell at the roots. After this, the ground may be drilled or shuffled with a hoe, in order to loosen its surface and kill the weeds. When the plants have made tolerably large bulbs, a double mould-board plough is sometimes passed between the rows for the purpose of ridging and earthing them up. This will serve to keep the ground dry, if the soil is naturally too moist, and assist the growth of the plants, the rapid progress of which will soon afterwards cover the intervals, and prevent the further growth of weeds.

Harvesting and Storing the Crop.—Turnips, wherever the soil and climate are favorable, may remain in the field, and be taken up as they are wanting. But this can only be done with safety on light, dry, well-drained land, secure from the depredation of animals, and in a country free from wintry frost or snow. Hence, on no account should this be attempted on the more retentive or undrained soils, nor in any portion of the Middle or Northern States, unless the turnips are covered with litter or straw.

Only the harder and more compact varieties of turnips, such as the yellow Aberdeen, the golden Maltese, and the Swedish, should be attempted to be stored at all. The white globe, the tankard, or decanter, and other tender kinds, are very difficult to keep either in the field or elsewhere, and should only be grown for early culinary use, or as a preparation for cattle and sheep previous to giving them the harder and less palatable yellow and Swedish kinds. As a general rule, in the middle latitudes of the United States, turnips may remain in the field until the latter end of November; but in no case should the storing be delayed beyond the falling of snow, or the closing of the ground by frost. In the more southern States the sowing may be continued from August until January or February, in order that a succession of crops may be had and used as occasion may require, without the trouble of storing.

Preparatory to storing, the turnips should be carefully drawn out of the ground by the hand or otherwise, and the tops and tap-roots cut off at one clean cut about an inch from the bulb. In doing this, the greatest care should be observed that the rind of the turnip be not in the least cut or bruised, as a bulb so injured is almost certain to rot in the heap when stored, which not only is apt to cause the loss of the bulb itself, but often the decay of those near it. All turnips thus injured should be thrown aside for immediate use. The tops may be given to cows, young cattle, or sheep, and the bulbs stored, according to the climate, for uses to which they are to be applied. The bulbs intended for early consumption may be put into a cool dry cellar or turnip-house, and used as circumstances may require; but those designed for long keeping should previously be exposed a day or two in a dry place, and then arranged in heaps about seven feet broad at the base, and as long as may be necessary, formed up to a narrow top. A layer of straw, say three or four inches thick, should first be spread on the ground, and on this a layer of turnips about two feet deep, and then other layers of straw and bulbs are to be formed alternately until the top be carried to a point, the projecting ends of the straw being turned up to prevent the turnips from rolling out. The whole heap

should then be covered with straw about six inches deep, not thrown on at random, but straightened out as in thatching a roof, and laid on so as to shed off the rain. Around the base of the heap a small trench, or ditch, should be dug for guarding the turnips from the wet.

By the foregoing method of storing, it will be understood that the object aimed at is to expose the turnips to as low a degree of temperature as possible, without freezing, by the circulation of air through the heaps, which, it is well known, will cause them to keep well at any point between 32° and 50° F.; but if the climate be such as to expose them to freezing cold, as in most parts of the Middle and Northern States, the heaps must be more thickly covered, either with earth or straw.

Another plan of storing, which I have known to succeed well in some parts of New England and New York, is, to bury the turnips late in the fall in a dry, gravelly, or well-drained soil, just below the reach of frost. In the April following, I have seen them dug up in nearly as hard and sound a condition as at the time they were buried. The main and absolutely necessary points to be observed in this mode of storing, is to keep the turnips secure from wet and frost, and near as possible to the temperature of 32° F.; which, if it cannot be done by the natural porosity of the soil, must be effected by under-draining and intermixing them with leaves, straw, or hemlock boughs.

Properties and Uses.—The chemical ingredients of which the turnip is composed, whether of the flat-bulbed or globe varieties, Swedes or hybrids, vary in their proportions, according to the soil, climate, season in which they are planted, and application of artificial manures.

The proportion of water in the bulbs and leaves is very variable, that of the bulbs ranging from 86 to $92\frac{7}{10}$, while that of the leaves from 70 to 90 per cent. The excess of water is attributable to the use of artificial manures, as guano, super-phosphate of lime, &c., which may cause 15 or 20 additional tons of turnips to grow upon an acre, but the increased crop may even be less valuable than a smaller produce, and the excess of weight being more than counterbalanced by the greater proportion of water. Experience has proved that by the use of artificial manure the apparent increase of water (wet weight) in the turnip may be as high as 35 per cent., while the real increase of solid matter (dry weight) may be only 14 per cent. It has been further proved by experiments that a very small deviation in the per-centage of water alters materially the value of the crop in feeding properties, so much so, that 10 tons of one crop may contain as much solid food as 20 tons of another.

The per-centage of mineral matter in the bulbs and tops of turnips is also very variable. The ash of the turnip bulb, in its ordinary condition, may contain from $\frac{48}{100}$ to $1\frac{13}{100}$ per cent. of mineral matter, while the ash given by the tops contains in almost all cases twice, and in many instances three times, as much mineral matter as the bulbs, varying from $1\frac{19}{100}$ to $2\frac{64}{100}$ per cent.

Little or no connexion appears to exist between the amount of mineral matter and the variety of plant. The flat-bulbs, Swedes, and the hybrids, or intermediate varieties, are but little distinguished from each other by the quantity of the mineral ingredients they contain, nor do

the soil and manure appear always to influence the turnip in these respects, as one sample grown on a chalky soil, manured with 20 single horse-cart loads of fermented farmyard dung, almost spent, and seed-drilled, in 112 pounds of bones dissolved in 56 pounds of sulphuric acid, with 20 bushels of ashes, to the acre; and another sample grown on dark mould, with a sub-soil of yellow clay, manured with 10 bushels of soot and 10 bushels pure cow-dung, mixed with 20 bushels of ashes and 112 pounds of bones, with 56 pounds of sulphuric acid, a very great similarity in the quantity of ash was observed, both in the bulbs and in the tops; and in other cases a difference may be seen in the mineral constituents of two turnips of different varieties grown in the same field with the same manure. But the evidence, on the whole, is in favor of the conclusion that the mineral matter is regulated more by the soil and manure than by the variety, although the distinctive character of the root is never set aside.

The composition of the ash of different varieties of turnips will be seen by the following tables, copied from the Journal of the Royal Agricultural Society of England, vol. viii.:

I.—*Composition (in one hundred parts) of the Ash of Turnip-bulbs.*

Varieties.	Skirving's Swede.	Skirving's Swede.	Dale's Hybrid.	Dale's Hybrid.	Skirving's Swede.	Green-topped White.	Mean of the six specimens.
Per-centage of ash	0.75	0.76	1.09	0.725	0.88	0.592	....
Silica	2.69	1.73	2.75	1.12	1.63	0.96	1.81
Phosphoric acid	9.31	10.17	8.77	10.71	12.51	7.65	9.85
Sulphuric acid	16.13	15.53	11.71	11.22	11.26	12.86	13.12
Carbonic acid	10.74	11.96	12.66	12.05	9.54	14.82	11.96
Lime	11.82	14.33	6.46	8.87	11.36	6.73	9.93
Magnesia	3.28	3.27	2.51	1.93	2.44	2.26	2.61
Peroxyd of iron	0.47	0.61	0.14	0.63	0.28	0.66	0.46
Potash	23.70	26.88	36.93	32.39	36.16	48.56	34.10
Soda	14.75	13.31	8.01	6.71	4.99	....	7.96
Chloride of sodium	7.05	2.19	10.00	14.30	9.77	5.44	8.13
Chloride of potassium	....	....	....	....	....	....	....
Total	99.93	99.98	99.94	99.93	99.94	99.94	99.93

II.—*Composition (in one hundred parts) of the Ash of Turnip-tops.*

Varieties.	Skirving's Swede.	Skirving's Swede.	Dale's Hybrid.	Dale's Hybrid.	Skirving's Swede.	Green-topped White.	Mean of the six specimens.
Per-centage of ash.	1.97	1.95	1.19	2.25	1.61	1.82	....
Silica	8.04	1.14	1.26	7.35	4.11	2.05	3.99
Phosphoric acid	4.85	6.21	4.58	11.70	6.54	3.15	6.17
Sulphuric acid	10.36	12.20	6.71	6.99	6.50	7.83	8.43
Carbonic acid	6.18	12.97	13.82	6.10	6.16	14.64	9.98
Lime	28.49	30.38	35.10	24.27	23.99	28.73	28.49
Magnesia	2.62	3.18	1.75	3.57	2.92	2.85	2.81
Peroxyd of iron	3.02	0.66	0.61	3.09	1.90	0.80	1.68
Potash	11.56	20.79	13.53	12.35	20.36	12.68	15.21
Soda	12.43	....	4.60	....	....	....	2.84
Chloride of sodium	12.41	10.31	18.02	22.70	17.69	10.67	15.30
Chloride of potassium	....	2.09	....	1.84	9.77	16.56	5.04
Total	99.96	99.93	99.98	99.96	99.94	99.96	99.94

From the first of these tables, we may learn that there is a certain and somewhat close resemblance between the composition of the ash of one turnip bulb and that of another. The quantity of phosphoric acid is seen to be tolerably constant, and the akalies, together, make up nearly the same amount.

The second table exhibits far wider differences in the composition of the ash—the phosphoric acid of one specimen being double that of some others, &c. In the growth of plants of this description, the elaboration of the materials is supposed to go on in the leaves from which the vegetable matter, when fully worked up, descends into the tubers, and is there deposited. The leaves, therefore, would not only contain their own proper mineral constituents, but the greater part of the excess of such bodies as had entered the plant.

The ash of the top differs from that of the bulb chiefly in containing less phosphoric and sulphuric acids, less potash, but a great deal more lime. Neither in the top nor in the bulb is there much silica, but the ash of both contains much carbonic acid, and a considerable quantity of chloride of sodium (common salt.) It will be seen that the leaves contain much more of the last named salt than the bulbs, the quantity in Dale's hybrid amounting to 11½ pounds to a ton of green tops. This circumstance may, in part, explain the action of turnip-tops in causing purging in sheep when they are first turned upon them to feed. Other alkaline salts, such as the phosphates of soda and potash, and other organic salts of these bases, oxalate, tartrate, &c., and which are known as purgatives, exist largely in the leaves of the turnip.

The turnip, like most root-crops, from the great development of its gas-collecting leaves, is believed to be comparatively independent of the soil for vegetable nourishment. It is stated that it may in reality have the property of adding to, rather than taking from, the quantity of vegetable matter in the soil, even when entirely removed, for land has been found, after several years cropping with turnips, all the produce being carried off, absolutely richer in organic matter than at first, the plant having returned to the soil more than it had taken from it. This principle is founded upon the belief, that, in the circulation of the vegetable juices of the plants, there is a continual ejection into the soil of matters not required in the economy of their growth; but whether the amount thus voided much exceeds that which is taken in by the roots it is difficult to decide. It is extremely likely, however, that in broad-leaved plants of rapid growth this result may sometimes occur.

The turnip is one of the most valuable roots for culinary or economical use. Its young tops, when boiled, afford a good substitute for greens. The bulbs are very useful in fattening cattle of every kind. Thus, if sheep be properly fed with them their flesh will acquire a delicate flavor, and it is well known that they will speedily fatten on the tops without eating the roots. Turnips, likewise, afford an invigorating food to horses; and, when cut into small pieces, these animals will be induced to eat chaff and other provender with an increased appetite. Cows devour both the tops and roots with equal avidity, but they are apt to impart (only at the commencement of eating them) an unpleasant flavor to their milk.

Consumption of the Crop by Stock.—It is generally admitted that the

nutritive properties of most kinds of vegetables are due to the quantity and quality of the dry matter contained in them, and that their water, although it may serve a useful purpose in filling the stomach, cannot fatten animals by itself, nor contribute directly to make flesh. Hence, it would follow, that from a large proportion of water it contains (about 90 per cent.) the fattening qualities, when used alone, of the turnip must be small. Indeed, experience has shown, in the western counties of Scotland, and it is the opinion of the majority of farmers in that country, that cattle cannot be made very fat on turnips alone, and that laboring animals fed entirely on roots of any kind, as their chief food, cannot perform their work with ease to themselves nor with economy to their owners. It is also well known that all animals thrive better on a mixed diet than when kept on the same kind of food, let it be ever so nutritious and rich.

In Great Britain, the turnip is generally fed to store cattle in winter, in conjunction with hay or straw. Under the most judicious management they are supplied with food at regular periods, and by the same man. The first thing in the morning, the cribs, or racks, are cleared of the unconsumed straw, which is thrown into the yard. A fresh supply of straw is then given them, and their troughs thoroughly cleaned and replenished with a supply of turnips, as young cattle are often incapable of eating them whole on account of the tender state of their mouths. They always have a constant supply of clear fresh water in or near their yard. After they have been furnished with their breakfast, they are kept as quiet as possible, in order that they may chew their cud in peace. A second supply of food is furnished before they become uneasy and call for it, or attempt to allay their hunger on the dirty straw of the yard. Another important operation, and one which is too often neglected, is the cleaning of the turnips before feeding them out. This can readily be done by putting them into a basket, and immersing it in a tub, a pond, or a stream of water, rolling the turnips about with a stick. On lifting the basket from the water, it will be found that the turnips will be sufficiently clean.

The consumption of the turnip crop by fattening cattle is also regarded as of the first importance, and on some farms in England by far the greatest proportion of this crop in that manner is disposed of. The cattle, for convenience, are generally tied up in stalls, but sometimes they are turned into apartments in lots of four or five together, each having a separate trough fixed against the wall, and guarded by a kind of stake, so that only one can approach it at a time. No animal of a restless or quarrelsome disposition is allowed on any account to be put with the others. Many cattle, however, are brought to a high state of fatness, which are fed in yards, well protected from cold winds, with a shed partly closed and facing the south. As in the case of the store cattle, those under the operation of fattening are regularly fed at stated times, cleaned out at the same hour every day, and when fed and cleaned, no person is allowed except their keeper to enter and disturb them. There is a saying in Scotland that "every time a byre of cattle is disturbed a shilling is lost to the owner." The greatest care is observed to clean out their troughs every day, as the food left to decay in them must be particularly disgusting to the poor animals kept

tied with their noses directly over them. When fed on a full supply of turnips, they generally require little or no water to drink. The kinds of food usually given, in conjunction with turnips, are sweet clean straw, or hay, oil-cake, shorts, ship-stuffs, crushed corn, Indian meal, &c. Lumps of rock salt, sufficiently large not to be taken into their mouths whole, are constantly kept within reach of the cattle, as they are extremely fond of licking them; besides, salt is thought to provoke their appetites, promote the secretion of bile, and, in general, is favorable to their activity and health. It is now well understood that turnips, when sliced, afford great facilities in devouring their food with the least trouble, and render them less liable to become choked; for when a beast gets a whole bulb into his mouth, he throws back his head, so that the turnip may drop between the molar teeth, and it often happens that it rolls into his throat.

The feeding of the turnip crop, or rather a portion of it, by sheep, either in the field or in the yard, where it can be practised, is a very desirable method of consuming it. All sheep fed on turnips in the yard should be supplied with hay or straw; but those under the process of fattening should be furnished with some of the richer kinds of food, such as oil-cake, shorts, ship-stuffs, Indian meal, crushed corn, &c. A precaution, however, must be observed in first giving them rich food, that they may be in pretty good condition before they are put to high feeding, and that this food be gradually increased both in quantity and quality. The plan of feeding in many of the well-informed parts of England, is to supply the sheep daily with turnips, in order that they may have them fresh, and eat them as they come, without devouring the dainty bits first. When a fresh portion is supplied, it is done in the afternoon, when the sheep are not so very hungry, in consequence of which there will be less danger of their hurting themselves by overeating. In may parts of England, it is customary to allow the sheep to consume the turnips in the field without removing them from the ground, first devouring the tops and then the bulbs. In this case, the turnip crop should never be eaten when wet, whether by rain, frost, or dew. The chief advantages derived from this system, are, the saving of the labor of harvesting the crop, and the expense of enriching the land by the cartage of manure, as the sheep leave in the field all the fertilizing matter contained in their food, which renders it in a good condition for sowing wheat.

D. J. B.

CONDENSED CORRESPONDENCE.

Statement of Henry M. Price, *of Nicholas Court House, Virginia.*

As sheep-raising increases in this region, more attention is paid to the cultivation of the turnip for winter-feeding. They grow unusually large, yielding from 500 to 800 bushels to the acre. They are always sown on new land Cost of raising, about $4 to the acre.

PUMPKINS.

The common field pumpkin, (*Cucurbita pepo*,) as well as the squashes, properly so called, is believed to be of American origin, as will appear from the following remarks by Dr. T. W. Harris, of Harvard University, in Cambridge, Massachusetts:

"Accident led me, some four years ago, to undertake the investigation of the history of squashes and pumpkins, which has led to quite interesting results. Most of the older and well-known species and varieties were by modern botanists supposed to have come originally from Asia, and particularly from India. This I have proved to be an error, and have shown that these fruits were wholly unknown to the ancients, no mention being made of them in the Scriptures, nor by Greek and Latin authors. The writers of the middle ages, while they describe or take note of other cucurbitaceous plants, entirely omit pumpkins and squashes; and these did not begin to be known and noticed in Europe till after the discovery of America. Early voyagers found them in the West Indies, Peru, Florida, and even on the coast of New England, where they were cultivated by our Indians before any settlements were made here by the Europeans. The old botanists, who flourished during the first century after the discovery of the New World, or the West Indies, begin to describe them for the first time; and give to them specific names, indicating their Indian (American) origin. Hence arose the mistake of modern botanists in referring these plants to the East Indies and to Asia.

"From a study of the history of the plant, I went next to a study of the species, with particular reference to their botanical characters, and to this end have been cultivating and examining every year all the kinds accessible to me. I think I have established the fact that all the fruits known by the names of 'pumpkins' and 'squashes' are of American origin; that there are three distinct groups of them; the first, including summer squashes, that have shells when ripe; the second, the winter squashes and pumpkins with deep, five-furrowed fruit, stems; and the third the winter pumpkins and squashes, with short, cylindrical and longitudinally wrinkled (but not five furrowed) fruit, stems. The last group was probably originally confined to tropical and sub-tropical parts of the western side of this continent, from California to Chili. The most esteemed varieties now cultivated in New England belong to this group, and the best of them are the 'autumnal,' 'Marrow,' and 'Acorn' squashes."

CONDENSED CORRESPONDENCE.

Statement of Matthew Harvey, *of Newport, Sullivan county, New Hampshire.*

In the autumn of 1852 a citizen of this place brought to me a common yellow pumpkin, which weighed 75 pounds. The following spring, the seeds of this pumpkin were planted promiscuously in my kitchen

garden with potatoes. The vines attained an enormous growth at an early period, and bore on a few rods of ground some seventy pumpkins, well matured, but generally smaller than the parent. Five of the largest of the lot were carefully selected, and weighed respectively as follows: No. 1, 105½ pounds; No. 2, 102 pounds; No. 3, 97 pounds; No. 4, 95 pounds; No. 5, 90 pounds. Nos. 1 and 2 were the production of one seed, the largest of which grew within a few feet of the roots of the vine.

It may be well to state that the land upon which these vines grew was covered for many years with a blacksmith shop, traces of which are still visible in its blackened surface, and in an abundance of coal and cinders mixed in the soil to a considerable depth. The ground was supplied with a liberal dressing of stable manure.

In the spring of 1854, I again tried the experiment of reproduction upon the same land with seeds taken from No. 1; but Nature seems to have exhausted herself the year previous, as the pumpkins raised from them did not even reach the usual size; neither did my neighbors succeed any better, who had been furnished with the seeds.

MISCELLANEOUS CROPS.

TOBACCO.

DIRECTIONS FOR THE CULTIVATION AND MANAGEMENT.

[Condensed from the Farmers' Register.]

The following hints were submitted for publication by the author, Mr. J. F. Edmunds, of Mecklenburg, Virginia, from the result of twelve years' successful experience, which, if perseveringly and attentively adhered to, may prove advantageous, particularly to those who are about to embark in this species of culture. The article is concise, brief, and much to the purpose, which are indispensable points in communications of this kind. D. J. B.

Raising Plants.—The land selected for the plant-bed should be grubbed, and the stumps of large trees cut very low. Where the land is dry, and in fit condition to burn, it should be raked, and all litter carefully removed. The fires should then be raised in the usual way, and after they have been properly kindled, should remain on the spot about one hour, and then be removed, continuing the operation in the same manner until the whole bed is burnt. The bed is next broken up with hoes, and sometimes with coulters drawn by horses or oxen, and the work repeated until the earth is made perfectly fine, being careful to avoid turning under the surface. All the roots should be

extracted, and the land laid off in beds (slightly elevated if dry, and more so if moist or wet) four feet wide. Then, to sixteen square yards a common pipe-bowl of seed is sown. The bed is next trodden or pressed with hoes, and well covered with brush. When the plants have come fully out, they should be slightly enriched with strong manure made fine; this should be repeated frequently, and in larger quantity as the plants increase in size, and are able to bear it.

Preparation and Planting.—Old land, or that which has been cultivated, after it has been repeatedly ploughed and made fine, is thrown into horizontal beds, four feet wide; and when ready for planting, a hand should be selected, prepared with a measure three feet long, which is to be his guide in "stepping" off the beds. With a little attention, and measuring occasionally, he can soon be accurate in the length of his step, which should be three feet. The hoe-hands follow on, and at each track, or foot print, a deep and thorough chopping is made, so that the space for the reception of the plant is deep and fine. The plant is then inserted, and a mark descending from it to the water-furrow is now made with the planting stick. The object of this mark is to drain off the water, and prevent the soil from running together and becoming hard about the plants by hasty rains, which are sometimes very injurious. There is some diversity of opinion whether beds as a preparation for planting are preferable to hills. I am decidedly in favor of beds. On high lands, half the amount of labor usually devoted to the hill, if bestowed on the bed, will make a much finer and softer situation for the plant. In making hills, much labor is lost; the top of the hill, after being made up, must be cut off or dragged down before planting. In preparing the bed, every lick counts; all the labor is condensed and confined to the space for the reception of the plants. Beds retain moisture longer than hills, being not so much exposed to the action of the sun and winds, and this is of great consequence, especially when the plant is drooping and weak from transplanting.

Cultivation.—It is important in the early growth of the plant to plough and work deep once or twice, so that when it is ripening the ground will be broken deep and fine. This should be effected without much interference with the roots, as that would check the growth, and prevent the plant from attaining its proper size. And hence the advantage of greater distance between the rows than the common one of three and a half feet, because the wide rows can be ploughed and worked with less damage to the roots. In this, as in all other crops, if we wish a good return, we must "speed the plough" and hoe before the roots run out. On our high lands, we should endeavor by deep and horizontal ploughing to counteract the bad effects of drought. On our flats, we should aim to prevent the collection of water, by drains discharging at the lowest points.

The bed is best for high land, because it retains more moisture where it is generally needed. The hill, retaining less moisture, is best for flat land, where there is commonly a superabundance.

Priming and Topping.—The most accurate topping is performed by measure. The topper carries in his hand a rule six inches long, and by occasionally measuring, he can regulate the priming with great

accuracy; and as the remaining leaves are numbered, this governs the operator, and gains the object of even topping. The topper should always carry this measure in his hand, as it serves to prevent excuses for negligence and uneven topping. Prime six inches, and top to eight leaves. I have found by experience that this is the best average height. I sometimes, but seldom, vary from this general rule. If the land is poorer than common, or if, from the backwardness of the plant and the advanced state of the season, I apprehend frost, I do not prime so high—say four inches. If I have an uncommonly rich spot, and there is danger that the top leaves will come to the ground, I top in the same proportion. The crop should be wormed and suckered at least once a week.

Cutting and Housing.—As soon as the crop is perfectly ripe and ready for the knife, when the plants are well matured, (which state I cannot describe, but must leave to the experience and observation of the planter,) I then approach the most difficult and delicate part of the whole operation, and the successful planter must now be all attention. The profit of the whole farm, for the year, greatly depends on the diligence and skill exercised in the few days of cutting and curing. We should, therefore, prepare well for this state of the crop, by having our barns close, our carts and wagons in good order, so that the work may be made as light as possible; for this is hard work, to make the best of it. To save a heavy crop, in the best manner, requires both energy and activity. The most judicious hands should be selected for cutters. When in the field, a middling or average hand should count the whole number of plants he cuts, so that allowing each cutter the same number, one may arrive at nearly the whole quantity cut. We should never cut more nor less than will fill the contemplated barn; otherwise there is labor lost in attending to a barn not full, or the overplus is injured for want of firing. The tobacco, after it has "fallen," or become sufficiently limber, is carried to the barn in carts or wagons, hung from six to ten plants on a stick, and stowed away for firing. It is also of great importance to be particular in the arrangement of the sticks. The equal and general circulation of heat throughout the house depends on the manner in which this is done. My barns commonly have three firing tiers above, and three below, the joists. I commence arranging the sticks on the most elevated tier in the roof, to which I give five inches distance; and on each tier, as I descend, I gain one inch, so that on the lowest tier, nearest the fire, the sticks are placed eleven inches apart. This disposition of the sticks, I have ascertained by late experiment, is important. The sticks of tobacco being wider apart next to the fires, gives a freer circulation, and, consequently, a more equal temperature, than the usual way of equal distance from bottom to top. The heat having more space to ascend, must be more equal and generally diffused, and will give a more uniform house of tobacco. I esteem this a considerable improvement; and if one has house room, and makes a greater difference in the proportionate distance between the sticks, it will be a still better arrangement.

Process of Curing.—I commence warming, or preparing the fires, the day after housing. I prefer what is commonly called the "bed-

logs" of green, and the "feeding" of dry or seasoned wood. By this arrangement, the fires are rendered more governable. The bed-logs should be nicely fitted to the barn floor, two lengths to reach across, the large ends placed outwards, to guard against the tendency of heat to the centre. I keep up the warming fires from thirty-six to forty-eight hours, the mercury ranging from 100° to 115° F. This will generally bring the leaf to the drying state. The tail, or end of the leaf, now begins handsomely to curl, and *then the planter must be wide awake*. If he is careless, and his fires are made too hot, the aromatic oil passes off with the sap and smoke, and he has a house of red or dark inferior tobacco. If his fires are kept too low, the tobacco gets into a clammy sweat, and the oil escapes. There is much more danger of the former than of the latter evil. There is more tobacco injured by too much heat than by the want of a sufficiency. The fires should now be kept steady and regular, with a gradual increase of heat, so that in forty-eight hours the mercury will stand 150° to 160°F. It must be kept at or about that temperature until the tobacco is cured.

Stripping and Prizing.—The tobacco should be taken down and packed in bulk, in order that it may be handled in cold weather without breaking. It is then divided, by select hands, into three classes for stripping: First, that which is of the best color and quality; secondly, that which is somewhat inferior, comprising the balance of the leaf; thirdly, "lugs," or ground leaves. Some distinguished planters make more classes, but this requires more attention and discrimination, and our laborers generally are not noted for either. It is then sized, and neatly tied in bundles of four leaves of the first, or six of the second and third classes. At the close of each day's stripping, and oftener if the weather is drying, we bulk down what has been stripped, being careful to pack straight. It is left in this situation until we wish to commence prizing, and then hung, from twelve to fifteen bundles on a smooth stick, and hoisted in the barn, the sticks placed six inches apart, the hoister carrying a rule in his hand. It is important to measure, as the order will be more uniform. It should remain until the stems are perfectly dry; after which it should be taken down for prizing, as dry as it can be handled without breaking. It remains in this state a few days until the leaves are pressed together, and we have soft weather for packing. Each bundle is then carefully straightened, repacked, and heavily weighted. It is then ready for prizing. We should prize in weather when the pliableness of the tobacco will not change. Each bundle should be straight and closely packed in hogsheads in the usual way.

CULTIVATION OF CUBA TOBACCO.

BY JOSEPH M. HERNANDEZ, OF ST. AUGUSTINE, FLORIDA.

The first thing to be considered in this, as in every other culture, is the soil, which, for the Cuba variety of tobacco, ought to be of a rich sandy loam, neither too high nor too low; that is, ground capable of retaining moisture. The more level the better, and, if possible, well

protected by margins. The next should be the selection of a spot of ground to make the necessary beds. It would be preferable to make these on land newly cleared, or at all events where it has not been seeded with grass; for grass seeds springing up together with tobacco would injure it materially, as the grass cannot be removed without disturbing the plants. In preparing the ground for the nurseries, break it up properly, grub up all the small stumps, dig out the roots, and carefully remove them with the hands. This being done, make the beds from three to four inches high, of a reasonable length, and from three to three and a half feet broad, so as to enable the hand, at arm's length, to weed out the tender young plants with the fingers from both sides of the bed, and keep them perfectly clean.

The months of December and January are the most proper for sowing the seed in Florida. Some persons speak of planting it as early as the month of November. I am, however, of opinion, that about the last of December is the best time to sow. Any sooner would expose the plants to suffer from the inclemency of the most severe part of our winter. Before the seed is sown, take some dry trash and burn it off upon the nursery beds, to destroy insects and grass seeds; then take an ounce of tobacco seed and mix it with about a quart of dry ashes, so as to separate the seed as much as possible, and sow it broadcast. After the seed has been thus sown, the surface of the bed ought to be raked over slightly, and trodden upon by the foot, carrying the whole weight of the body with it, in order that the ground may at once adhere closely to the seed, and then water it. Should the nursery beds apparently become dry from blighting winds or other causes, watering will be absolutely necessary; for the ground ought to be kept in a moist state from the time the seed is sown until the young plants are large enough to remove.

The nurseries being made, proceed to prepare the land where the tobacco is to be set out. If the land is newly cleared, (and new land is probably more favorable to the production of this plant than it is to that of any other, both as respects quality and quantity,) remove as many of the stumps and roots as possible, and dig up the ground in such a manner as to render the surface perfectly loose; then level the surface, and in this state leave it until the nursery plants have acquired about one-half the growth necessary to admit of their being set out. Next, break up the ground a second time in the same manner as the first, as in this way all the small fibres of roots and their rootlets will be more or less separated, and thus obviate much of that degree of sponginess so common to new land, and which is, in a great measure, the cause of its seldom producing well the first year, as the soil does not lay close enough to the roots of the plants growing in it, so that a shower of rain produces no other effect than that of removing the earth still more from them. Should the land be such as to admit of being worked with the plough, it ought certainly to be preferred to the common hoe. The plough, however, should be excluded after the plants are set out.

The ground having been prepared and properly levelled off, and the plants sufficiently grown to be taken up, say of the size of good cabbage plants, take advantage of the first wet or cloudy weather to com-

mence transplanting. This should be done with great care, and the plants put single at equal distances; that is, about three feet north and south, and two and a half or two and three-fourths feet east and west. They are placed thus close to each other to prevent the leaves from growing too large. The directions of the rows, however, should alter according to the situation of the land. Where it has any inclination, the widest space should run across it, as the beds will have to be made so as to prevent the soil from being washed from the roots by rain when bedded; but where the land is rather level, the three-foot rows should be north and south, so as to give to the plants more effect of the sun by passing directly across the beds rather than obliquely over them. To set the plants out regularly, take a task line 105 feet in length, with a pointed stick, three feet long, attached to each end of it; then insert small pieces of rags or something else through the line, at the distance of two feet and three-fourths from each other; place it north and south, (or as the land may require,) at full length, and then set a plant at every division, carefully keeping the bud of the plant above the surface of the ground. Then remove the line three feet from the first row, and so on until the planting is completed. Care ought to be taken to prevent the stretching of the line from misplacing the plants. In this way, the plants can be easily set out, and a proper direction given to them both ways. In taking the plants up from the nursery, the ground should first be loosened with a flat piece of wood or iron, about an inch broad, then carefully holding the leaves closed towards each other, between the fingers, draw them up and place them in a basket, or some other convenient thing, to receive them for planting. After taking up those which can be planted during the day, water the nursery, that the earth may again adhere to those remaining. The evening is the best time for setting out the plants, but where a large field has to be cultivated it will be well to plant both morning and evening. The plants set out in the morning, unless in rainy or cloudy weather, should be covered immediately, and the same should be done with those planted the evening previous, should the day open with a clear sunshine; the palmetto leaf answers this purpose very well. There should be water convenient to the plants, so as to have them irrigated morning and evening, but more particularly in the evening, until they have taken root. It is hence generally necessary that wells should be sunk at convenient distances throughout the fields. The plants should also be closely examined when watered, so as to replace such as happen to die, that the ground may be properly occupied and all may ripen as nearly together as possible.

From the time the plants are set out, the earth around them should occasionally be stirred both with a hoe and the hand. At first, hoe flat, but as soon as the leaves assume a growing disposition, begin gradually to draw a slight bed towards the plants, which must be closely examined, even while in the nursery, to destroy the numerous worms that feed upon them, which cut the stalks and gnaw the leaves when first set out. They resemble the grub-worm, and are to be found near the injured plant under ground. Others, which come from the eggs deposited on the plant by a butterfly, and feed on the leaf, grow to a very large size, and look very ugly, and are commonly called the "tobacco-worm."

There is also a small worm which attacks the bud of the plant, and which is sure destruction to its further growth; and some again, though less destructive, are to be seen within the two coats of the leaf, feeding as it were on its juices alone. The worming should be strictly attended to every morning and evening, until the plants are pretty well grown, after which every other day will be sufficient. The most proper persons for worming are either boys or girls of from ten to fourteen years of age. They should be made to come to the tobacco ground early in the morning, and be led by inducements (such as giving a trifling reward to those who will bring the most worms) to worm it properly. Grown persons would find it rather too tedious to stoop to examine the under part of every leaf and seek the worm under ground; nor would they be so much alive to the value of a spoonful of sugar, or other light reward. Besides, where the former would make this search a matter of profit and pleasure, it would prove to the latter only a tedious and irksome occupation. Here I will observe, that it is for similar reasons that the culture of the Cuba tobacco-plant more properly belongs to a white population; for there are few plants requiring more attention and tender treatment than it does. Indeed, it will present a sorry appearance, unless the eye of its legitimate proprietor is constantly watching over it.

When the plants have acquired from twelve to fourteen good leaves, and are about knee high, it may be well to begin to top them, by nipping off the bud with the aid of the finger and thumb nail,* taking care not to destroy the small leaves immediately near the bud; for if the land is good, and the season favorable, those very small top leaves will, in a short time, be nearly as large, and ripen quite as soon as the lower ones, whereby two or four more leaves may be saved; thus obtaining from sixteen to eighteen leaves in the place of twelve or fourteen, which is the general average. As the topping of the tobacco-plant is all-essential in order to promote the growth, and to equalize the ripening of the leaves, I would observe that this operation should, at all events, commence the instant that the bud of the plant shows a disposition to go to seed, and be immediately followed by removing the suckers, which it will now put out at every leaf; indeed, the suckers should be removed from the plant as often as they appear. The tobacco-plant ought never to be cut before it comes to full maturity, which is known by the leaves becoming mottled, coarse, and of a thick texture, and gummy to the touch, at which time the end of the leaf, by being doubled, will break short, which it will not do to the same extent when green. It ought not to be cut in wet weather, when the leaves lose their natural gummy substance, so necessary to be preserved.

About this period, the cultivator is apt to be rendered anxious by the fear of allowing the plants to remain in the field longer than necessary, until experience removes these apprehensions. He should be on his guard, however, not to destroy the quality of his tobacco by cutting it too soon. When the cutting is to commence, there should be procured a quantity of forked stakes, set upright, with a pole, or rider, sitting on

*Washing the hands after this in water is necessary, as the acrid juices of the plants, otherwise, would soon produce a soreness of the fingers.

each fork, ready to support the tobacco and keep it from the ground. The plant is then cut obliquely even with the surface of the ground, and the person thus employed should strike the lower end of the stalk two or three times with the blunt side of his knife, so as to cause as much of the sand or soil to fall from it as possible; then tying two stalks together, they are gently placed across the riders, or poles, prepared to receive them. In this state, they are allowed to remain in the sun or open air, until the leaves have somewhat wilted, whereby they will not be liable to the injury which they would otherwise receive if they came suddenly in contact with other bodies when fresh cut. Then, place as many plants on each pole, or rider, as may be conveniently carried, and take them into the drying-house, where the tobacco is strung off upon the frames prepared for it, leaving a small space between the two plants, that air may circulate freely among them, and promote their drying. As the drying advances, the stalks are brought closer to each other, so as to make room for those which yet remain to be housed.

In drying the tobacco, all damp air should be excluded; nor should the drying of it be precipitated by the admission of high drying winds. This process is to be promoted in the most moderate manner, except in the rainy season, when the sooner the drying is effected the better; for it is a plant easily affected by the changes of the weather, after the drying commences. It is liable to mildew in damp weather; that is, when the leaf changes from its original color to a pale-yellow cast, and from this, by parts, to an even brown. When the middle stem is perfectly dry, it can be taken down, and the leaves stripped from the stalk and put in bulk to sweat; that is, to make tobacco of them; for before this process, when a concentration of its better qualities takes place, the leaves are always liable to be affected by the weather, and can not well be considered as being anything else than common dry leaves, partaking of the nature of tobacco, but not actually tobacco. The leaves are to be stripped from the stalks in damp or cloudy weather, when they are more easily handled, and the separation of the different qualities rendered also more easy. The good leaves are at this time kept by themselves for "wrappers," or "caps," and the most defective ones for "fillings."

When the tobacco is put in bulk, the stems of the leaves should all be kept in one direction, to facilitate the tying of them in hanks; afterwards making the bulk two or three feet high and of proportionate circumference. To guard against the leaves becoming overheated, and to equalize the fermentation or sweating, after the first twenty-four hours, place the outside leaves in the centre, and those of the centre to the outside of the bulk. By doing this once or twice, and taking care to cover the bulk either with sheets or blankets, so as to exclude all air from it, and leaving it in this state for about forty days, it acquires an odor strong enough to produce sneezing and the other qualities of cured tobacco. The process of curing may then be considered as completed. Then take some of the most injured leaves, but of the best quality, and in proportion to the quantity of tobacco made, and place them in clear water; there let them remain until they rot, which they will do in about eight days; next break open your bulks, spread the tobacco with the stems in one

direction, and dampen them with this water in a gentle manner, in order that it may not soak through the leaf; for in this case, the leaf would rot.* Then tie them in hanks of from twenty-five to thirty leaves. This being done, spread the hanks in the tobacco-house for about twelve hours to air, in order that the dampness may be removed, and afterwards pack them in casks or barrels, and head them tight, until you wish to manufacture them. The object of dampening the tobacco with this water is to give it elasticity, to promote its burning free, to increase its fragrance, to give it an aromatic smell, and to keep it always soft. This is the great secret of curing tobacco for cigars, properly, and for which I am indebted to the people of Cuba, who certainly understand the mode of curing this kind of tobacco better than any other. It is to them a source of great wealth, and may be made equally so to us. We can have here three cuttings from the original plant; the last cutting will be of rather weak quality, but which, nevertheless, will be agreeable to those who confine their smoking to weak tobacco.

In "ratooning" the plant, only one sprout ought to be allowed to grow, and this from those most deeply rooted; all other sprouts should be destroyed.

The houses necessary for the curing of tobacco ought to be roomy, with a passage-way running through the centre, from one extremity of the building to the other, and pierced on both sides with a sufficient number of doors and windows to make them perfectly airy.

In addition to what I have said respecting the mode of cultivating and treating the tobacco-plant, I have further to state, that the plant once allowed to be checked in its growth, never again recovers it. That in promoting the drying of the leaf, fire should not be resorted to, because the smoke would impart to it a flavor which would injure that of the tobacco itself.

In order to obtain vigorous plants, the seed ought to be procured from the original stalk, and not from the "ratoons," by allowing some of them to go to seed for that express purpose. In Cuba, the seed is most generally saved from the ratoon plants, but we should consider that its climate and soil are probably more favorable to the production of this plant than ours, and, consequently, we ought to confide in the best seed, which can be had from the original stalks.

CONDENSED CORRESPONDENCE.

Statement of JOSEPH C. ORTH, *of McCleary's Bluff, Wabash county, Illinois.*

Tobacco is considerably cultivated here; and were it not for the amount of labor it requires at particular times, it would be the most profitable crop our farmers could cultivate. In 1853, I raised a small patch, and kept an account of expenses, &c. The result was as follows:

* A sponge is used in Cuba for this delicate operation.

DR.

To rent for three-twentieths of an acre, (24 rods)	$0 45
To ploughing	25
To sowing seed, care of plants, and planting, say	2 00
To planting	75
To hoeing	1 00
To destroying worms	3 00
To gathering	1 00
To care of curing and pulling from stem	3 00
	11 45

CR.

By 95 pounds cured tobacco, which was valued by our tobacconists at 20 cents per pound	19 00
Leaving a balance of gain of	17 55

In this account, the rates for labor are too high, but it still leaves a balance of $117 per acre clear profit. This might be increased $25 per acre where large fields are cultivated together.

SUGAR-CANE.

ITS HISTORY AND PRODUCTION IN MISSISSIPPI.

[Condensed from Wailes' Report on the Agriculture and Geology of Mississippi.]

The sugar-cane is cultivated to a limited extent in some portions of the State. By the census returns, it appears that the crop of 1849 was equal to 388 hogsheads and about 18,000 gallons of molasses, which has been made as far north as latitude 33° 40′, in Chickasaw county, where an experiment of three years has encouraged the belief that sugar can be profitably produced there to the extent of the local demand. Sugar has also been made in Hinds county, on a small scale for experiment, and small patches of the cane become more common as we approach the sea-shore; east of Pearl river, and south of Covington county, many of the most substantial planters making all the sugar and molasses required for their own use, with some to spare to their neighbors. The cane is obviously becoming gradually acclimatised, and may at no distant period be grown advantageously throughout the greater portion of the State for home consumption.

The sugar-mills are, of course, rude and of small dimensions, consisting, in fact, of little more than the rollers for grinding the cane, which are made of seasoned oak timber, and stand, generally, in the open air; a common shed suffices for a protection of the kettles, which are common iron ones, such as are used for stock. There are two of these mills in Pike county, and as many in Amite, where molasses has

been made. In Marion county, there are some eighteen to twenty, and several in Perry.

Should the ravages of the "army-worm" and the "rot" continue to increase, and the present price of cotton not be maintained, the period is not remote, perhaps, when the cane will, to considerable extent, supersede the cultivation of cotton on the river plantations as high up as Natchez or Vicksburg.

RESEARCHES ON THE SORGHO SUCRÉ.

A new gramineous plant, which seems to be destined to take an important position among our economical products, was sent some four years since from the north of China, by M. de Montigny, to the Geographical Society of Paris. From the cursory examination of a small field of it growing at Verrières, in France, in autumn last, I was led to infer that, from the peculiarity of the climate and its resemblance in appearance and habit to Indian corn, it would flourish in any region wherever that plant would thrive. But how far it will subserve the purposes ascribed to it in France, should it even succeed in any part of the United States, can only be determined by extended experiments.

There appears to be a doubt among the scientific cultivators in Europe as to the true botanical name of this plant. *Holcus saccharatus*, which is evidently an error, has been provisionally adopted by M. Louis Vilmorin, of Paris; but as the term is already applied to our common broom corn, if not to other species, this name cannot with propriety be retained. *Sorghum vulgare*, (Andropogon sorghum, of others,) M. Vilmorin thinks, in all probability, would comprehend it as a variety as well as Andropogon cafra, bicolor, etc., of Kunth. Mr. Leonard Wray, of London, who has devoted much time and attention to the cultivation of this plant, with a view of extracting sugar from its juice, at Cape Natal and other places, informed me that in the southeast part of Caffraria there are at least fifteen varieties of it, some of them growing to a height of 12 or 15 feet, with stems as thick as those of the sugar-cane. M. Vilmorin also says that, in a collection of seeds sent to the Museum at Paris, in 1840, by M. d'Abadie, there were thirty kinds of sorghum, among the growth of which he particularly recognized several plants having stems of a saccharine flavor. Thus it will be seen that there is much cause of confusion and a necessity for a critical examination of the subject. I would state, however, that Messrs. Vilmorin and Groenland are engaged conjointly in the cultivation and in determining the properties of this and the allied species, and we have every reason to hope that their researches will enable us soon to know their botanical types.

The plant which was experimented upon at Florence, in 1766, by Pietro Arduino for the extraction of sugar, very likely belonged to this or some allied species; yet it must have been of a different variety, since he describes its seeds as being of a clear brown color, while those of the plant in question are quite black, and in appearance identical with the black sorghum of the old collections.

The sorgho sucré is a plant which, on rich land, grows to a height of from 2 to 3 or more yards. Its stems are straight and smooth, having leaves somewhat flexuous and falling over, greatly resembling Indian corn in appearance, but is more elegant in form. It is generally cultivated in hills containing eight or ten stalks each, which bear at their tops a conical panicle of dense flowers, green at first, but changing into violet shades, and finally into dark purple at maturity. In France, it is an annual, where its cultivation and period of growth correspond with those of Indian corn; but from observations made by M. Vilmorin, it is conjectured that, from the vigor and fullness of the lower part of the stalks, in autumn, by protecting them during the winter, they would produce new plants the following spring. If cultivated in our Southern States, it is probable that the roots would send forth new shoots in spring, without protection, in the same manner as its supposed congener, the Dourah corn. At the North, the maturity of the seed probably would be more certain if planted in some sheltered situation; but if the object of cultivating for the extracting of sugar, or for fodder for animals, an open culture would be sufficient where the soil is rich, light, and somewhat warm. According to the experiments of M. Ponsart, the seeds vegetate better when but slightly covered with earth. M. Ledocte proposes to associate with the plant another of more rapid growth, such as lettuce or rape, in order that the laborers may distinguish the young sorgho from grass, which it greatly resembles in the early stage of its growth. Any suckers, or superfluous shoots, which may spring up in the course of the season, should be removed.

The great object sought in France in the cultivation of this plant is the juice contained in its stalks, which furnishes three important products, namely, sugar, which is identical with that of cane, alcohol, and a fermented drink analogous to cider. This juice, when obtained with care and in small quantities, by depriving the stalk of its outer coating or woody fibre and bark, is nearly colorless and consists merely of sugar and water. Its density varies from 1.050 to 1.075, and the proportion of sugar contained in it from 10 to 16 per cent., a third part of which is sometimes uncrystallizable. To this quantity of uncrystallizable sugar, this juice owes its facility of readily fermenting, and consequently the large amount of alchohol it produces, compared with the saccharine matter, observed directly by the saccharometer. In so far as the manufacture of sugar is concerned, this plant appears to have but little chance of success in a northern climate, as a large proportion of that which is uncrystallizable is not only a loss in the manufacture, but an obstacle to the extraction of what is crystallizable. It must not be understood, however, that the produce of this plant is unprolific or difficult to obtain, but that all things being equal, its nature renders it more abundant in alcohol than in sugar. Yet it would be very different in the warmer climate at the South, where sugar-cane is difficult to be obtained, in requiring protection from frost. From experiments made by M. Vilmorin on some dried stalks of sorgho sent from Algeria, it proved that the product of sugar obtained from them was infinitely superior to that produced by the same plant which had been cultivated near Paris. I was also informed by Mr. Wray, who


ft. in
7 . 2

experimented upon the juice at Natal, that the proportion of crystallizable sugar quite predominates where the climate allows the plant fully to mature.

The chief advantage of the sorgho, as a sugar plant, is the facility of its cultivation and the easy treatment of the juice. It is thought that the rough product may surpass that of the sugar-cane in those countries where the latter is an annual, and like which, its stalks and leaves will furnish an abundance of nutritious forage for sustaining and fattening animals. As the molasses, too, is identical with that manufactured from the cane, it may be used in the distillation of rum, alcohol, and the liquor called "tafia," which resembles brandy. The greatest difficulty to be apprehended, probably, would be the preservation of the stalks from fermentating, owing to the short time left to the manufacture. This, however, might be obviated, as Mr. Wray informed me that, in the neighborhood of Natal, the Zoulous-Caffers preserved it for a long time by burying the stalks in the ground, notwithstanding the climate of their country is very warm and damp. It will also be observed that in the manufacture of brandy or alcohol, the uncrystallizable sugar can be turned to account, which, in a measure, would otherwise be lost. Another advantage consists in the pureness of the juice, which, when thus converted, from the superiority of its quality, can immediately be brought into consumption and use. The alcohol produced by only one distillation is nearly destitute of foreign flavor, having an agreeable taste, somewhat resembling noyau, being much less ardent, or fiery, than rum.

One of the points M. Vilmorin was desirous of establishing was, at what period of the growth the stalks began to contain sugar, and, consequently, when its manufacture should commence. He came to the conclusion that it coincided with the putting forth of the spikes; but the proportion of sugar in the stalk continued to increase until the seeds were in a milky state. In the plant in flower, he observed that the amount of sugar diminished in the mérithalles (parts of the stalks between the nodes, or joints,) the nearer they were to the top; and, also, that the lower part of each mérithalle contained less saccharine matter than the upper. In consequence of this, and owing to the smallness and hardness of the lower knots, the centre of the stalk is the richest portion. He was inclined to the opinion that, at a later period, the mérithalles lower down the stalk are impoverished in the amount, if not in the quality, of the sugar they contain.

The ripeness of the seeds does not appear much to lessen the production of sugar, at least in the climate near Paris; but in other countries where it matures when the weather is still warm, the effect may be different. According to the report of M. de Beauregard, addressed to the "Comice de Toulon," the ripening of the sorgho, in that latitude, had no unfavorable effect; and he considers the seeds and the sugar as two products to be conjointly obtained. On the other hand, Mr. Wray says that the Zoulous-Caffers are in the habit of pulling off the panicles of the plant the moment they appear, in order to augment the quantity of saccharine matter in the stalks. This question may be of some importance in our Southern States, should this plant supersede in any manner the sugar-cane.

Having considered some of the probabilities of this product in an economical point of view, it remains only for me to recommend it to the attention of others who may have opportunities to cultivate it, and the means and talent to prove or refute, by direct experiment, its worth.

D. J. B.

BROOM-CORN.

CONDENSED CORRESPONDENCE.

Statement of ELIHU SMITH, *of Sunderland, Franklin county, Massachusetts, as reported to the Board of Agriculture of that State, in* 1854.

The piece of broom-corn which I enter for premium, containing one acre and nine rods, is situated in the "North Meadow," in this town, and is a part of five acres which I cultivated in the same manner, as follows:

The previous fall and winter, I drawed to the lot 20 cords of muck, which I mixed with 5½ cords of sheep manure. In April, the whole was turned over and mixed, and 18 bushels of ashes added. About the 1st of May, it was turned over a second time, and on the 15th of the same month applied to the land by harrowing in. The field was planted with Woodward's corn-planter, and 100 pounds of super-phosphate of lime put in the hills. The land was cultivated and hoed four times, and yielded, by estimation, 800 pounds of brush to an acre. Broom-corn had been grown on the land the two previous years.

The crop raised on the acre and nine rods, which I enter, yielded of brush 1,025 pounds, and of seed 67 bushels, weighing 40 pounds to the bushel.

VALUE OF THE CROP.

1,025 pounds of brush, at 10 cents	$102 50
67 bushels of seed, at 40 cents	26 80
	129 30

EXPENSES.

Ploughing, harrowing, and planting	2 50
Manure	12 00
Hoeing	7 00
Harvesting, scraping, and cleaning the seed	10 00
Interest on the land	7 00
	38 50
Net profit	90 80

Statement of SOLYMAN G. HAMLIN, *of West Glenville, Schenectady county, New York.*

Broom-corn, for many years, has been cultivated to a considerable extent with us, especially on the "flat lands" lying along the Mohawk river, and is considered a profitable crop. The principal objections to growing it on "up land" are, that it makes no fodder nor manure, except the stalks, which are but of little importance either as a fertilizer or for feed. They are generally consumed in the field after the brush is taken off.

The usual method of cultivation is to plow the land in the spring, harrow it, until the soil is pulverized and mellow, and then roll it down smooth with a revolving plank or log roller. The seed is sown with a drill as early in the spring as the condition of the ground will admit, in rows, at the distance of 3 feet apart, and from 6 to 8 inches asunder in the drills. As soon as the corn is above ground, a narrow space of land on each side of the row is scraped with the hoe, to prevent the weeds from hindering its growth, the remaining space being left for the cultivator, which is frequently run to keep down the weeds. The cultivation is finally finished by running the plow twice to each row.

The brush is cut while green, and as often as convenient. As it grows from 8 to 12 feet high, the tops are first bent, or lopped, to one side and cut, with 7 or 8 inches of the stalk left on. Each stalk composes a "brush."

Statement of M. F. MYERS, *of Kingston, Luzerne county, Pennsylvania.*

Broom-corn is extensively raised on our river flats, and is a profitable crop. Average yield of seed 50 bushels to the acre, worth 50 cents a bushel. I have known $85 an acre to be paid for the crop before it was harvested.

TOMATOES.

CONDENSED CORRESPONDENCE.

Statement of RALEIGH W. DYER, *of Prillaman's, Franklin county, Virginia.*

My mode of cultivating tomatoes is to sow the seeds in January or February in my plant beds with tobacco and other seeds. As soon as the plants will do to take up, I transplant them in rows, about 16 inches apart, into beds of loose earth, using manure where the ground is not already rich. The manure should be well mixed with the earth. After the plants get about a foot high, I put a frame or net-work of forked sticks and small poles around them, to prevent the fruit from

weighing them to the ground. When this happens, the plants do not bear so well, nor is the fruit so good. The seed should always be gathered from the largest and fairest fruit.

CAPERS.

CONDENSED CORRESPONDENCE.

Statement of H. M. Bry, *of Washita parish, Louisiana*

Among other valuable plants of Europe, which I have attempted to introduce into this State is the caper (*Capparis spinosa.*) From some roots which I obtained from Marseilles, I raised two crops of buds (capers) equal to any I had ever seen in Italy. I lost the plants by frost, being absent during the winter when proper care should have been taken to cover the roots with earth.

I would remark that three years ago, I received some caper seed from Naples, which did not germinate, owing, as I think, to packing them in air-tight vessels.*

OKRA, OR GUMBO.

CONDENSED CORRESPONDENCE.

Statement of John B. C. Gazzo, *of La Fourche parish, Louisiana.*

The okra (*Hibiscus esculentus*) is a thrifty plant, growing from 7 to 10 feet high. It should be sown in drills 3 feet apart, and the plants standing singly about 18 inches apart.

"Gumbo soup," made of okra, is an Epicurean dish in Louisiana. When properly cooked, it is hardly excelled by any other vegetable in agreeable flavor and wholesome quality. The ripe seed, if allowed sufficient age before using, and carefully parched, can with difficulty be distinguished from genuine coffee.

BENE PLANT.

CONDENSED CORRESPONDENCE.

Statement of H. M. Bry, *of Monroe, Washita parish, Louisiana.*

In 1843, I sent 16 bushels of seeds of the "bene" plant (*Sesamum orientale*) to a mill in Cincinnati to be manufactured into oil. It yielded

* May not this failure more probably be attributed to the exposure of the cases containing the seeds to a temperature of 70° or 80° F., in the hold of the vessel, and destroying their vitality by that means rather than by excluding the external air? D. J. B.

39 gallons of clear oil, and about 5 quarts of refuse oil, or about 2½ gallons to the bushel.

In consequence of the mill imparting the flavor of flaxseed, I could not use it as a salad oil, for which purpose I am confident it would be superior, when pure, to the adulterated imported olive-oil. I used it, however, as a substitute for castor-oil, and gave a considerable quantity away for that purpose. All who used it, praised it highly both for its gently purgative effect and from being free from the nauseous taste peculiar to castor-oil.

I cannot state with certainty how much seed this plant will produce to the acre, but believe that 20 bushels is a moderate estimate.

The leaf of the plant is an excellent remedy for bowel complaints in children and also in adults. For this purpose, two or three leaves are put into a tumbler of water, which they immediately render mucilaginous, but impart no disagreeable taste. The negroes cultivate it for food, using the parched seeds with their meats.

I consider it so useful that a few stalks at least should be raised in every garden. And I believe it will soon be extensively cultivated for manufacturing oil, yielding as it does, about a gallon to a bushel more than flax-seed.

I doubt whether it will mature well north of latitude 36°. It should be planted as soon as the frost is out of the ground. Poor land is best suited to its production, as it branches too much in rich soil, because the pods are more liable to shatter from the branches than from a single upright stem. The seeds should be planted in drills 3 feet apart, and 6 inches distant along the drills.

FRUITS, NUTS, AND WINE.

THE PRODUCTION FROM SEED OF NEW VARIETIES OF FRUITS, ADAPTED TO PARTICULAR LOCALITIES AND TO GENERAL CULTIVATION.

BY MARSHALL P. WILDER, OF BOSTON, MASSACHUSETTS.

The immense loss to American cultivators from the importation of foreign varieties not well adapted to the countries from which they come, and often still less so to our soil and climate, suggests the importance of raising from seed native sorts which, in most instances, possess peculiar advantages. It is now generally conceded that the trees and plants of a given country, like its aboriginal inhabitants, will flourish better at home than in most foreign localities.

I rejoice that public attention has been turned to this subject by some of our horticultural journalists, and that many cultivators and amateurs are engaged in this interesting and promising department. The success which has crowned their exertions affords great encouragement to perseverance. Witness, for instance, thirty or more varieties of the cherry, by Dr. Kirtland, of Ohio, which appear adapted

to our Eastern climate, and some of them of superior excellence. Witness too the numerous varieties of the raspberry, by Dr. Brincklé, ex-president of this society, of which some have endured, without covering, the severities of the last winter in the New England States, and which also promise to be valuable contributions to American pomology. In addition to these, how many new varieties of the apple, the pear, the plum, and the grape have recently been added to our list of fruits. How many new and excellent varieties of the strawberry have appeared since the introduction of Mr. Hovey's seedlings.

These are sure indications of the success which will reward future efforts to obtain valuable and native varieties of fruit; and they point to the fulfilment of the prediction of the celebrated Van Mons, "that the time will come when our best fruits will be derived from seedlings." He gives the following sage counsel to his correspondents, to whom he had sent trees: "Sow your seed and persevere without interruption, and you will obtain even better fruit than mine."

Among pioneers in this department, I am happy to notice a gentleman, (now residing among us, Mr. L. E. Berckmans,) the pupil and friend of Van Mons, one who has adopted our country as his future home, and who has already transplanted to our soil many thousand choice seedlings of the pear, which have come into his possession from the collections of that gentleman and the celebrated Esperen.

As to the best method of producing fine varieties from seed, the opinions of distinguished pomologists are not uniform. Duhamel, among the French, from causes which seem now to us irreconcilable with nature and experience, entertained serious doubts of the practicability of any method for obtaining new and valuable varieties from seed, especially of the pear, because he had tried various experiments without success for fifty years. Van Mons, of Belgium, instead of saving the seed of the finest varieties, selected those of inferior sorts, upon the principle that a kind having arrived at the highest state of perfection must deteriorate, while an inferior one must improve by successive reproductions. He also held that hybridization tended to degeneracy and imperfection. Thus he assumes the doctrine that a perfect variety necessarily deteriorates, and also overlooks the fact observed by other distinguished men, that the improvement or deterioration of which he speaks may result from natural impregnation by the pollen of other varieties, conveyed by the air or insects, and, therefore, that the seed of a good variety may produce either a better or a worse, and that of a bad either a worse or a better.

Mr. Knight's system of obtaining new and improved varieties depended entirely on hybridization, or artificial impregnation, so lightly esteemed by Van Mons. This is somewhat difficult to practise, on account of natural fertilization by insects and the wind; but it has the merit of depending on a truly philosophical principle, and, with very particular attention, may yet prove as available for the improvement of our fruits as it has for the production of fine varieties in the vegetable and floral kingdoms; or as the corresponding principle has in the crossing of the breeds of domestic animals. The results of Mr. Knight's experience disprove the tendency to degeneracy, inasmuch as many of his fruits, obtained by hybridization, are among the most durable and

hardy varieties, as the "Eyewood" and "Dunmore" pears, the "Black eagle" and other cherries.

Many cultivators, as Esperen, Bivort, Berckmans, and others, both in this and in foreign countries, have sown seeds in variety, and have obtained some valuable sorts. But I am confirmed in the opinion, that the best means of producing new and excellent varieties, suited either to general cultivation or to particular localities, is to plant the most mature and perfect seeds of the most hardy, vigorous, and valuable sorts, on the general pathological principle that "like produces like;" and upon the conviction that immature seed, although the embryo may be sufficiently formed to vegetate, yet, not having all its elements in perfection, it will not produce a vigorous and healthy offspring. Dr. Lindley, commenting upon this practice, justly remarks: "All experience shows, that in every kind of created thing, be it man, or beast, or bird, the mysterious principle called life remains during the whole period of existence what it was at first. If vitality is feeble in the beginning, so it remains. Weak parents produce weak children, and their children's children are weaker still, as imperial dynasties have sadly shown." With him I believe this theory as applicable to the vegetable as to the animal kingdom. May not a disregard of this doctrine account for the great number of feeble, sickly, early-defoliated trees, often found in our grounds by the side of those which are vigorous, healthful, and persistent in foliage? Is not the theory I advocate as important in the production of fruit trees, as in the raising of Cereal grains? The skilful agriculturist saves the best seed of his various crops, and selects the best animals from his herds and flocks for breeders. Why should not this law of reproduction regulate the practice of the pomologist as well as of the farmer? Has the All-wise and Infinite enacted several laws where one would subserve the purpose?

To the doctrine of Van Mons and other distinguished writers, respecting deterioration by age, and after a variety has reached its perfection, there seems to be some exceptions. From the accounts of oriental travellers, may we not believe that the grapes of Eschol are as perfect now as when the chiefs of Israel plucked their rich clusters three thousand years ago? and that the same variety of the fig, the olive, and the pomegranate are as perfect in Syria to-day as in the period of David and Solomon? It is worthy of enquiry whether the native grapes on the banks of our rivers have deteriorated since the day when the red men of the forest refreshed themselves with fruits from those vines, and whether the orange, the lemon, the banana, and fruits of southern latitudes evince any more signs of decay than they did centuries ago? In a word, whether this doctrine of deterioration is as applicable to the native as to the foreign fruits of a country?

Why may we not expect to obtain natural varieties of the apple and other fruit as durable and far more valuable than those which have passed their second centennial, as the Endicott and Stuyvesant pears? From meterological or other causes, which we do not at present understand, particular varieties may deteriorate in a given locality, for a season, and afterwards revive; or, they may show signs of decay in one locality and flourish well in others not very remote, as the White Doyenné, which has been considered, for many years, by some in this vi-

cinity, on the decline, while it is perfect in several places in Maine, New Hampshire, Vermont, and other States. Fruit-bearing may exhaust the vital energy of the tree, and hasten decay, but still the variety may remain. We have, among fruit trees, no example of longevity equal to that of the new Taxodium, found in California, supposed to be three thousand years old. Our object is not to controvert the opinions of those who believe in the running out of varieties, whether their duration be limited to one hundred or one thousand years, but to enforce the importance of raising new varieties from seed, especially adapted to our own location.

FRUITS FOR GENERAL CULTIVATION.

The following named fruits were recommended for general cultivation by the American Pomological Society at their meeting at Boston in September, 1854.

APPLES.

American Summer Pearmain,
Baldwin,
Bullock's Pippin,
Danver's Winter Sweet,
Early Harvest,
Early Strawberry,
Fall Pippin,
Fameuse,
Gravenstein,
Hubbardston Nonsuch,
Lady Apple,
Ladies' Sweet,
Large Yellow Bough,
Melon,
Minister,
Porter,
Red Astrachan,
Rhode Island Greening,
Roxbury Russet,
Summer Rose,
Swaar,
Vandervere,
White Seek-no-further,
Williams' Favorite, (except for light soils,)
Wine Apple, or Hays,
Winesap.

PEARS.

Ananas d'Été,
Andrews,
Belle Lucrative, or Fondante d'Automne,
Beurré d'Anjou,
Beurré d'Aremberg,
Beurré Diel,
Beurré Bosc,
Bloodgood,
Buffum,
Dearborn's Seedling,
Doyenné d'Été,
Flemish Beauty,
Fulton,
Golden Beurré of Bilboa,
Lawrence,
Louise Bonne de Jersey,
Madeline,
Manning's Elizabeth,
Paradise d'Automne,
Rostiezer,
Seckel,
Tyson,
Urbaniste,
Uvedale's St. Germain, (for baking,)
Vicar of Winkfield,
Williams' Bon Chrétien, or Bartlett,
Winter Nelis.

PEARS.

For Cultivation on Quince Stocks.

Belle Lucrative,
Beurré d'Amanlis,
Beurré d'Anjou,
Beurré d'Aremberg,
Beurré Diel,
Catillac,
Duchesse d'Angoulême,
Easter Beurré,
Figue d'Alençon,
Glout Morceau,
Long Green of Cox,
Louise Bonne de Jersey,
Napoleon,
Nouveau Poiteau,
Rostiezer,
Beurré Langelier,
Soldat Laboreur,
St. Michel-Archange,
Triomphe de Jodoigne,
Urbaniste,
Uvedale's St. Germain, or Belle Angerine, (for baking,)
Vicar of Winkfield,
White Doyenné.

PLUMS.

Bleecker's Gage,
Coe's Golden Drop,
Frost Gage,
Green Gage,
Jefferson,
Lawrence's Favorite,
McLaughlin,
Purple Gage,
Purple Favorite,
Reine Claude de Bavay,
Smith's Orleans,
Washington.

CHERRIES.

Belle Magnifique,
Black Eagle,
Black Tartarian,
Downer's Late,
Downton,
Elton,
Early Richmond, (for cooking,)
Graffion, or Bigarreau,
Knight's Early Black,
May Duke.

APRICOTS.

Breda,
Large Early,
Moorpark.

NECTARINES.

Downton,
Early Violet,
Elruge.

PEACHES.

Bergen's Yellow,
Cooledge's Favorite,
Crawford's Late,
Early York, (serrated,)
Early York, large,
George IV.,
Grosse Mignonne,
Morris White,
Oldmixon, (free.)

GRAPES.

Under Glass.

Black Hamburg,
Black Frontignan,
Black Prince,
Chasselas de Fontainbleau,
Grizzly Fontignan,
White Frontignan,
White Muscat of Alexandria.

Open Culture.

Catawba,
Diana,
Isabella.

RASPBERRIES.

Falstoff,
Franconia,
Knevet's Giant,
Red Antwerp,
Yellow Antwerp.

STRAWBERRIES.

Boston Pine,
Hovey's Seedling,
Large Early Scarlet.

CURRANTS.

Black Naples,
May's Victoria,
Red Dutch,
White Dutch,
White Grape.

GOOSEBERRIES.

Crown Bob,
Early Sulphur,
Green Gage,
Green Walnut,
Houghton's Seedling,
Ironmonger,
Laurel,
Red Champagne,
Warrington,
Woodward's White Smith.

BLACKBERRIES.

Lawson's New Rochelle.

NEW VARIETIES WHICH PROMISE WELL.

APPLES.

Autumn Bough,
Benoni,
Coggswell,
Genesee Chief,
Hawley,
Jeffries,
Ladies' Winter Sweet,
Monmouth Pippin,
Mother,
Primate,
Smoke House,
Winthrop's Greening, or Lincoln Pippin.

PEARS.

Adams,
Alpha,
Beurré Clairgeau,
Beurré Giffard,
Beurré Sterckmans,
Beurré Superfin,
Beurré St. Nicholas,
Brand's St. Germain,
Brandywine,
Chancellor,
Charles Van Hooghten,
Collins,
Comte de Flanders,
Doyenné Boussoch,
Doyenné Goubault,
Duchesse d'Orléans,
Duchesse de Berri,
Epine Dumas,
Fondante de Malines,
Fondante de Noel,

Howell,
Jalousie de Fontenay Vendée,
Kingsessing,
Kirtland,
Limon,
Lodge, (of Penn.,)
Nouveau Poiteau,
Onondaga,
Ott,
Pius IX.,
Pratt,
Rousslet d'Esperin,
Sheldon,
St. Michel-Archange,
Stevens' Genesee,
Striped Madelaine,
Theodore Van Mons,
Van Assene, or Van Assche,
Walker,
Zepherin Gregoire.

PLUMS.

Ive's Washington Seedling,
Monroe Egg,
Prince's Yellow Gage,
River's Favorite,
St. Martin's Quetche.

CHERRIES.

American Amber,
Belle d'Orléans,
Bigarreau Monstreuse de Bavay,
Black Hawk,
Coe's Transparent,
Early Purple Guigne,
Governor Wood,
Great Bigarreau, of Downing,
Hovey,
Kirtland's Mary,
Ohio Beauty,
Reine Hortense,
Walsh's Seedling.

GRAPES.

Concord.

RASPBERRIES.

French,
Orange,
Walker.

STRAWBERRIES.

Walker's Seedling.

REJECTED FRUITS.

APPLES.

Beachamwell,
Caroline, (English,)
Cathead,
Cheesboro' Russet,
Dodge's Early Red,
Egg-top,
Fenouillet Rouge,
Gloucester White,
Golden Reinette,
Grand Sachem,
Grey French Reinette,
Henry's Weeping Pippin,
Hoary Morning,
Irish Peach,
Kirk's Lord Nelson,
Large Red Sweeting,
Marmalade pippin,
Muscovia,

Pennock,
Pigeonnet,
Priestley,
Red Doctor,
Red Ingestrie,
Red or Royal Russett,
Rowland's Red Streak,
Salina,
White Ingestrie,
Woolston's Red Streak,
Woolston's White Sweet.

PEARS.

Admiral,
Ah! Mon Dieu,
Alexander of Russia,
Angers,
Apple Pear,
Armudi
Autumn Bergamot,
Autumn Superb,
Astontown,
Beauty of Winter,
Belle d'Aôut,
Belle de Bruxelles,
Belmont,
Bergamotte d'Automne,
Bergamotte Fortunée,
Bergamotte Sylvange,
Bergamotte Zappa,
Beurré Adam,
Beurré Audusson,
Beurré d'Angleterre,
Beurré de Bollwyller,
Beurré Colmar d'Automne,
Beurré Coloma,
Beurré Kenrick,
Beurré Knox,
Beurré Seutin,
Beurré Van Mons,
Bezi Vaet,
Bishop's Thumb,
Blanquet à lougue Queue,
Bleecker's Meadow,
Bon Chrétien d'Été,
Bon Chrétien d'Hiver,
Bon Chrétien Bruxelles,
Bon Chrétien d'Espagne,
Bonequia,
Bouquet,
Brougham,
Bruno de Bosco,
Brugman's Birne,
Burgomaster,
Caillot Rosat,
Calebasse, or Pit's Prolific,
Cassolette,
Chair à Dame,
Charles Van Mons, (old,)
Chat Brulé,
Citron de Bohême,
Citron de Sierenz,
Clapp,
Clara,
Clinton,
Columbus d'Hiver,
Comte de Fresnel,
Copea,
Crassanne,
Crawford,
Croft Castle,
Cuvelier,
D'Amour,
Dearborn of Van Mons,
Deschamps, (new late,)
Downton,
Doyenné Doré,
Doyenné Mons,
Dubossury,
Dumbarton,
Duquesne d'Été,
Elton,
Endicott,
English Warden,
Flamenga,
Fantasie Van Mons,
Figue Extra,
Forme des Délices,
Forme Urbaniste,
Foster's St. Michael,
Frederic of Prussia,
Franc Real d'Hiver,
French Iron,
Garnstone,
Gendeseim,
Girardin,
Great Citron of Bohemia,

Green Catherine,
Green Chisel,
Green Sugar,
Green Yair,
Grisse Bonne,
Gros Blanquet,
Gros Bousselet,
Hâtiveau,
Hawthorne's Seedling,
Hays,
Hericart,
Hessel,
Horticulture,
Huguenôt,
Hunt's Connecticut,
Ipswich Holland,
Jacob,
Jalousie,
Jargonelle, (of the French,)
John Monteith,
Jubin,
Kramelsbirne,
Lansac,
Lavalle,
Lederbirne,
Lincoln,
Locke,
Louise Bonne,
Louise de Bologne,
Mabille,
Madame Vest,
Madotte,
Marcellis,
March Bergamot,
Marie Louise, (new,)
Martin Sec,
Marquise,
Michaux,
Miller's Seedling,
Moorfowl Egg,
Navet,
Oak Leaf, (Imperial,)
Orange,
Orange Rouge,
Orange Tulipée,
Pailleau,
Passans de Portugal,
Passe long Bras,
Petit Muscat,
Phillips,
Pitfour,
Pitt's Marie Louise,
Platt's Bergamot,
Pomme Poire,
Pope's Quaker,
Pope's Russet,
Pope's Scarlet Major,
Prince's Portugal,
Princess of Orange,
Queen Caroline,
Queen of the Low Countries,
Quilletette, of Manning,
Rameau,
Reine d'Hiver,
Reine des Poires,
Rousselet d'Hiver,
Rousselet de Rheims,
Rousselet St. Vincent,
Royale d'Hiver,
Rushmore's Bon Chrétien,
Sabine, (Flemish,)
Sans Pepins,
Sapianski,
Shobden Court,
Souveraine,
St. Bruno,
Striped Madeline,
Sugar Pear, of Hoyerswerda,
Summer Bergamot,
Summer Rose,
Summer Thorn, or Epine d'Été,
Superfondante,
Supasse Meuris,
Swan's Egg,
Swiss Bergamot,
Tellington,
Thompson, (of New Hampshire,)
True Gold of Summer,
Truchardy Dulle,
Tucker's Bon Chrétien,
Tucker's Seedling,
Veste Longue Panachée,
Wellington,
Whitfield,
Winter Crassane,
Winter Orange,
Winter Quince,
Wurzur d'Automne,
Yutte.

FRUITS OF CONNECTICUT.

Statement of GEORGE GABRIEL, *of* ———, T. H. TOTTEN, *of New Haven;* H. W. TERRY, *of Hartford;* WILLIAM CLIFT, *of Stonington;* T. R. DUTTON, *of Hartford, Connecticut, as reported to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

APPLES.

In the middle region of our State, the two past seasons have been remarkably dissimilar. The one now closing has been very dry, while that of 1853 was very wet; the two extremes nearly alike unfavorable to the cultivation of good fruit, with, perhaps, the exception of grapes both foreign and native) cultivated in the open air. These stand severe droughts, ripen earlier, are superior in flavor, and, at the same time, are less liable to mildew and the rot.

The early part of the season of 1853 was made remarkable, also, by the appearance of the Palmer-worm, so called, in great numbers, which destroyed the foliage of the apple trees as well as that of some others, and, of course, injured the fruit more or less. This insect eats the leaves as voraciously as the canker-worm, and at about the same season, namely, June. They did not appear again this year.

Very much fruit, it is believed, was destroyed last spring by a severe frost that occurred on the first Saturday night in May, the effects of which were more noticed than the cause. The morning was bright and clear, and the ground, where it had been broken up, frozen hard enough to bear up a man of common size. Plum trees, cherries, and, perhaps, some others, were in profuse bloom at the time, but failed almost entirely of producing fruit. Apple buds generally were also much injured.

PEARS.

The pears regarded as worthy of cultivation at New Haven and vicinity are as follows:

SUMMER PEARS.

Beurré Giffart,
Bloodgood,
Dearborn's Seedling,
Doyenné d' Été,
Rostiezer Tyson,
Souveraine d' Été,
Van Mon's Elizabeth.

FALL PEARS.

Andrews,
Bartlett,
Belle Lucrative,
Bezi de la Motte,
Brown Buerré,
Beurré d' Amanlis,
Beurré Bosc,
Beurré Diel,
Beurré Gobault,
Capiaumont,
Cushing,
Doyenné Boussoch,
Don,
Dix,
Duchesse d' Angoulême,
Duchesse d' Orléans,

Elizabeth,
Flemish Beauty,
Gansel's Bergamot,
Golden Beurré,
Heathcote,
Henrietta,
Howell,
Louise Bonne de Jersey,
Mansfield,
Marie Louise,
Onondaga,
Paradis d' Automne,
Punderson,
Sterling,
St. Ghislain,
Tea,
Urbaniste,
Van Mons Leon le Clerc,
Wilkinson,
White Doyenné.

WINTER PEARS.

Beurré d' Aremberg,
Columbia,
Dallas,
Easter Beurré,
Glout Morceau,
Passe Colmar,
Winter Nelis.

There are many other varieties cultivated in this region, both foreign and native, which your committee have not thought proper to add until further experience. We may have erred in regard to some already noted in the above list.

PEACHES.

The difficulties attending the raising of this fruit still continue in this region, and also generally throughout the State; and yet in some places good success has attended its culture. Mr. Davis, of Derby, Mr. Rossiter, of Guilford, and Mr. Meggatt, of Farmington, have raised, for several years past, as handsome and as good peaches as could be desired, and large crops.

QUINCES.

Quince trees bear abundantly, in our sandy soil, large and handsome fruit. The benefit of top "pruning," root "pruning" and manuring is as manifest in the cultivation of this fruit as any other. The "Orange" or "Apple" variety is considered the best here.

PLUMS.

"Green Gage," "Imperial Gage," "Jefferson," and "Washington," rank among the best. Many other varieties are cultivated in and around New Haven, some of which may be equal to the above, such as—

Bleecker's Gage,
Coe's Golden Drop,
Frost's Gage,
Goliah,
Huling's Superb Buel,
Smith's Orleans.

CHERRIES.

Many varieties are cultivated here, the following being considered best:

Black Eagle,
Black Tartarian,
Coe's Seedling,
Elkhorn,
Flesh-colored Bigarreau,
Holland Bigarreau,
Kentish Morello,
May Duke,
Napoleon Bigarreau,
White Bigarreau.

CURRANTS.

This excellent fruit does not generally receive the attention its merits entitle it to. None is more wholesome and better adapted to our wants during the warm summer months. By thorough pruning and suitable culture, it can be raised of much larger size and better quality than is commonly found in our gardens. The "Red" and "White Dutch" are as good as any. We have raised them for a number of years about double the usual size.

GRAPES.

"Isabella," "Catawba," and "Diana" are the best hardy varieties. The "Hinfindal" (a foreign variety) is cultivated here very considerably, and does nearly, if not quite, as well as under glass. It needs some protection during winter.

STRAWBERRIES.

In New Haven, most of the strawberries which have come into notice have been, or are on trial, to the number of some forty or more varieties. "Boston Pine" and "Hovey's Seedling" are classed as best. Following is a list of others, some of which will doubtless prove to be as good, and rank as high, as the first named:

British Queen,
Burr's New Pine,
Crescent Seedling,
Cushing,
Jenny,
Lizzie Randolph,
Longworth's Prolific,
McAvoy's No. 1, and Superior,
Peruvian,
Princess Alice Maud,
Schneicke's Pistillate,
Willey.

RASPBERRIES.

The common or "American Red," "Franconia Falstoff," "True Red Antwerp," "Knevet's Giant," "Red Antwerp," rank as best. Several other varieties are cultivated here, some of which, perhaps, belong in the same rank. All these, except the first named, are supposed to need protection during the winter. We have learned, however, by experience, that several of them, if planted under apple or other trees on the northward and westward sides, need no protection, direct rays of the sun being broken off.

FRUITS OF MAINE.

Statement of Henry Little, *of Bangor;* S. L. Goodale, *of Saco;* Ezekiel Holmes, *of Winthrop;* Alexander Johnson, jr., *of Wiscasset; and* Daniel Tabor, *of Vassalboro', in the State of Maine, as reported to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

APPLES.

Last year, the fruit crop in this State was generally good. Of apples, moderate. The winter succeeding surpassed in severity any previous

one for twenty years or more, and serious losses were sustained. A degree of cold equal to 31° F. below zero, following an autumn warm and unusually late, and consequently acting much upon imperfectly ripened wood, and in too many cases upon trees weakened by over-bearing, might well have been feared.

In consequence of the severe drought of the past summer, which was more so than since 1841, no rain having fallen for seventy-five days previous to the first week in September, the crop of the present year has consequently been very light, and less opportunity has been afforded than was desired for testing many new varieties, and the more so, as on many trees not apparently otherwise injured the blossom buds were so much injured as to fall without opening. Yet we are not the less confident in regard to the ultimate profit and general success of fruit culture in Maine, if judiciously managed in the matter of the selecting of suitable varieties, and of subsequent cultivation. As to the adaptation of varieties to soil and climate we know something; but much remains to be learned. Of the necessity of thorough cultivation we already know more than we practise.

Allow us to press this point, and urge all who propose to plant trees to invest in the operation some money, care, and labor, say one dollar's worth in all for each young tree, to purchase, plant, and care for it the first year, and fifty cents for each year afterwards. This would suffice, and would not be extravagant. Should this be faithfully done, it would be reasonable to anticipate a good profit on the investment. In a few years, each tree would probably yield as much as the interest of $100 or $200, and would continue to do it for many years.

The committee are confident that there is no way by which the lands of Maine can be used that will pay a greater per-centage to the acre than by the introduction of the finer varieties of apples, which are suited to the climate. They therefore recommend the extensive cultivation of the choicest and long-keeping varieties. That the winter apples of Maine possess a sharper and a higher flavor, and are more crispy and finer in texture than those of the same varieties grown in other States, in a warmer climate, with a longer season, there is no doubt. They also decidedly possess better keeping qualities. This gives our cultivators an advantage when large quantities are grown for exportation. The fact that our long-keeping fruits may be successfully carried to nearly all parts of the world is calculated to allay the fears of any who may apprehend that the extensive planting of fruit trees would result in overstocking the market.

Maine is largely interested in shipping. Our supplies of ice never fail, and immense quantities are annually transported to foreign countries; and our fruit and ice can go well together. Baldwin and other long-keeping apples have been carried with ice to Calcutta, and there sold at high prices, weeks and even months after our apples at home have been exhausted.

Of the varieties to which we would refer, we would name the following:

Aunt Hannah,	Beefsteak,
Baldwin,	Bell's Early,

Blue Pearmain,
Danvers Winter Sweet,
Duchesse d'Oldenberg,
Early Sweet Bough,
Fameuse,
Golden, or Orange Sweet,
Golden Ball,
Gravenstein,
Hawley,
Hubbardston Nonsuch,
Mexico,
Minister,
Mother,
Nodhead, or Jewett's Fine Red,
Norton's Melon,
Northern Sweet,
Northern Spy,
Porter,
Red Astrachan,
Rhode Island Greening,
Ribstone Pippin,
Roxbury Russet,
St. Lawrence,
Talman's Sweet,
Vandervere,
Vermont,
Wagner,
Williams' Favorite,
Winthrop Greening.

PEARS.

The cultivation of this fine fruit is rapidly extending in this State, a great impetus having been imparted by the introduction of the quince stock; it being found by the use of the Angers variety, and the careful selection of sorts adapted to it, many varieties can be grown in the highest perfection, which either entirely fail on the pear root, or would not repay the trouble and cost of cultivation. The following have been cultivated with great success:

Bartlett,
Beurré d'Aremberg,
Beurré d'Amanlis,
Beurré d'Anjou.
Beurré Bosc,
Beurré Clairgeau,
Beurré Giffard,
Beurré St. Nicolas,
Beurré Superfin,
Buffum,
Dearborn's Seedling,
Doyenné d'Été,
Doyenné Boussoch,
Duchesse d'Angoulême,
Dunmore,
Flemish Beauty,
Fulton,
Glout Morceau,
Jalousie de Fontenay Vendée,
Laurence,
Louise Bonne de Jersey,
Marie Louise,
McLaughlin,
Napoleon,
Passe Colmar,
Rostiezer,
Seckel,
Stevens' Genesee,
St. Ghislain,
Tyson,
Urbaniste,
Vicar of Winkfield,
White Doyenné,
White Nelis.

PLUMS.

Great quantities of this fruit are raised in Maine, but most successfully on the Penobscot river, in Bangor and vicinity, where plums meet a ready sale, at prices from $3 to $5 per bushel. Those best suited to this region are as follows:

Apricot,
Bleecker's Gage,
Columbia,
Corse's Nota Bene,
Drap d'Or,
Green Gage,

Hudson Gage,
Imperial Gage,
Imperial Ottoman,
Jefferson,
Laurence's Favorite,
Lombard, or Bleecker's Scarlet,
McLaughlin,
Purple Favorite,
Reine Claude de Bavay,
Royale Hâtive,
Smith's Orleans,
St. Martin's Quetsche,
Washington Seedling, (Ives',)
White Magnum Bonum,
Yellow Gage.

FRUITS OF MARYLAND.

Statement of Samuel Feast, *of Baltimore, Baltimore county, Maryland, as reported to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

The climate of Maryland often proves very unfavorable to the cultivation of choice fruit, being located, as it were, between two extremes. A few warm days, as we frequently have during the winter and early spring, start the sap of the trees so much that the buds become so far developed as to be easily destroyed by a slight frost.

I have paid some slight attention to the seasons here for thirty-eight years, and have never experienced a more variable winter than this last one has been. We have never had any extreme cold, but changeable. In the latter part of November and first week of December, we had very warm weather; the peach buds developed so much that I was apprehensive they would all be destroyed in the winter. I discovered that a great portion was injured. The latter part of February and first two weeks in March were warm. Vegetation was ready to break forth. Apricots were in full bloom. Some few peaches, pears, and nectarines were open. It commenced blowing from the northwest, and continued so for ten or twelve days, the atmosphere at time dry and frosty; it cut everything that was opposed to it. Some of the early blooming varieties of pears, such as "Beurré Rance," "Doyenné d'Alençon," "Doyenné Blanc," "Doyenné Gris," "Easter Beurré," "Maria Louise," "Triomphe de Jodoigne," and several others were entirely destroyed; likewise the branches of several of the trees were so much injured that I had to prune them severely. The last season's wood appeared, in many cases, as if it had passed through a fire. This, I suppose, would be called frozen sap. Some of the varieties of the peach I found to be nearly destroyed, particularly the Crawford, Late Melocoton. The peach, nectarines, many of the plums, damsons, and pears are at present in full bloom (April 16.) The last two days have been very disagreeable, with rain and cold winds. At sunset, last night, it commenced freezing, with rain, sleet, hail, &c.; this morning, the ground is well coated over with snow; the trees, branches, young green leaves, and flowers are covered over with icicles; it is also snowing, and the wind blowing almost a gale from the north. I am thus particular, as I want to ascertain what degree of cold the fruit trees will bear when in bloom, and when charged with moisture. It

continued snowing all day, until six o'clock the morning of the 17th. That night, there was a very hard frost; the next morning everything was locked up as in mid-winter, and we could not enter the ground with a spade. The apples were not in bloom, notwithstanding the greater part were destroyed. Peaches, plums, nectarines, gooseberries, currants, were all gone. The flowers and young pears remained on the trees, and appeared not to be injured; but as they began to swell, they became deformed and crooked in the foot stalk, and finally dropped from the tree. This was on one of the most elevated and exposed locations; besides, there had never been known a failure of the fruit crop on the place before.

The following remarks are confined to the varieties in each class which have proved their worth and adaptation to the soil and climate of Maryland. Many of the varieties of the apple and pear, inserted in the catalogues of fruit, as winter fruit, ripen here in early autumn, when peaches are generally plentiful, which makes other fruit of little or no value.

The soil of Maryland, like most other portions of the country, varies in its formations; but many sections are well adapted to the production of fruit of every description.

The shores of the Chesapeake bay, and its various inlets, give a large surface of country. These lands being sandy and alluvial, besides being generally of a level surface, together with a water communication, induces the fruit-growers to select them in preference to more elevated regions, particularly for the strawberry and peach. The life of the peach tree is but of short duration on these soils; the orchardist calculating on but three or four crops before the fruit becomes small, bitter, and worthless. The best apple orchards are found on the elevated and dry ground, where the subsoil is of a porous and open nature, composed of mica, hornblende, or rotten rock, slate, &c. The trees in these sections attain a larger size, and the fruit arrives to a greater perfection on such soils, than when planted on stiff, wet clays.

The climate of Maryland equals that of any portion of the Union for ripening fruit, which can be brought to as great perfection, provided proper knowledge and care be made use of in the selection of proper varieties. Unfortunately for us, the landed proprietors are fond of things far-fetched, many of them thinking they can be better supplied from the North than at home.

On passing through one of the best orchards in the State, the first of this month, there was not one tree in ten with fruit on it. Had the owner consulted some man of experience as to varieties suitable for this section, instead of sending abroad for his trees, the present worth of his orchard would have been ten-fold. I never was more convinced of this fact than when passing through this orchard, as no expense had been spared in cultivation; the ground had been continually under the plough since the trees were planted, ten years ago, and the soil the best adapted for fruit culture in the State, is composed of a sort of brown rotten stone, which dissolves with the winter frost into a fine friable loam, mixed with white flint and a bluish-green stone. This orchard is located on the southern end of an irregular ridge of land,

extending round the city of Baltimore, from five to seven miles. On land of this description, the roots penetrate to a great depth out of the way of droughts, such as we frequently have at this season of the year.

The peach crop has been an entire failure this year, so much so, that the Pennsylvanians consider it for their interest to send to the Baltimore market. The cause of the failure was owing to the cold spell on the 17th of April.

We have one great drawback here to fruit-culture, which is becoming more formidable every year—the various insects that sting the fruit. I was in hopes that, after the cold spell we had, there would be no fruit left for them to carry on their depredations ; but, unluckily, we had sufficient for their purpose, and they have taken advantage of it. These depredators can never be exterminated so long as the present course of neglectful practice is continued by the owners of orchards through the State. The greater part of the fruit which ripens at a season when fruit is of little or no value, is suffered to decay under the trees in place of being fed to stock. In every part of the State large orchards are visible, this fruit forms a nursery for their increase. So destructive have they become that, last season, 1853, the crop of apples was plentiful, but many owners of orchards were scarcely able to pick up a barrel of sound fruit in the fall.

The plum, apricot, and nectarine have received but little attention, owing to the curculio. In the vicinity of Annapolis, on the bay shore, they ripen well without any trouble.

APPLES.

The apples which attain the greatest perfection here are "Early Harvest," "Yellow Bough," "Summer Queen," "Maiden's Blush," "Rambo," "Yellow Belle-fleur," "French Reinette," "Rhode Island Greening," "Holland or Belvidere Pippin," "English Red Streak," as sold here, "Kentish Fillbasket," "Yellow" and "Green Newtown Pippin." The latter name I have always been led to believe is incorrect, according to a list of an orchard planted in 1793. This apple was sent out from Prince's nursery as the New York Greening. There can be no comparison between the fruits when grown on the same ground and with the same cultivation. The trees and growth resemble each other, but not in shape of fruit nor in flavor, "Pomme d'Api," "Roxbury Russett," "James River," "Vandervere," "Smoke House," "White Robinson," and "Hugh's Virginia Crab." For cider there are many more varieties, but none to surpass those ripening in like season.

PEARS.

More attention, of late years, has been paid to the planting of the pear, particularly on the quince root, than formerly. The borers will prevent an extensive planting on this stock, owing to the care required to keep them free. Of the old varieties, the following ought to be in every collection: "Jargonelle," on pear stocks, "Julienne," "Madelaine," "Brown Buerré," "Seckel," "Doyenné Blanc." The last two are the *beau ideal* of pears, and no collection can be complete without them. They both require generous treatment, and cannot be encouraged too much.

Of the new varieties of pears which have proved superior, the following may be set down as the best: "Doyenné d'Été," "Beurré Giffard." The last will become one of the greatest favorites for this part, when known. "Bartlett," "Rostiezer," "Fondante d'Automne," "Bon Chrétien Fondant," "Louise Bonne de Jersey," "Duchesse d'Angoulême." This, on a generous soil, and on quince stocks, is certainly a splendid fruit. "Beurré Bosc," "Glout Morceau," "Lawrence," "Winter Nelis," "Easter Beurré," "St. Michel-Archange," with Vicar of Winkfield.

The Winter Nelis, in my estimation, excels any other in its season, even the Seckel. The tree is a straggling grower, but with proper care it can be made into a good shape.

A list of pears proved to be good and worthy of cultivation is as follows:

Belle de Thouars,
Beurré Beaumont,
Beurré Giffard,
Beurré Quetelet,
Bonne de Zees,
Bezy d'Espérin,
Cathinka,
Colmar Sauverain,
Comtesse d'Alost,
Délices d'Hardempont,
Figue d'Alençon,
Ghislain,
Juvardiel,
La Porte,
Louise de Prusse,
Oken d'Hiver,
Reine d'Hiver,
Suzette de Bavay,
Triomphe de Jodoigne.

The blight on the pear I have found to be caused by high culture, causing the tree to grow late in the fall, thereby preventing the wood from being well matured. Fire-blight proceeds from the same cause.

On planting out my pear orchard, in order to continue the ground square, one corner encroached on the site of an old orchard and garden. The soil was rich, and would grow good vegetables; the other part was very poor, but had not been in trees for many years. The fruit of the same varieties taken from the two portions cannot be recognised as the same; the trees, likewise, are stunted, and of a starved appearance. I have not been able to remedy it, even with deep trenching, liming, ashes, and peat. It is to this cause I attribute the cracking of fruit, a deficiency in the sub-soil of some material necessary to its perfection.

CHERRIES.

The high lands are well adapted to the cultivation of cherries. The trees, when sufficiently large, produce enormous crops. I picked from one tree, in the season of 1853, three hundred and fifty quarts of the Kentish cherry. Many of the new varieties have not been tried sufficiently to speak of them correctly. Of the old ones "Black Tartarian," "May Duke," "Bigarreau," "Red Bigarreau," "Kentish," "Yellow Spanish," "Halifax," "Belle de Choisy," and the "Carnation," are all of them of good quality.

GOOSEBERRIES.

These cannot be cultivated in the country to advantage, owing to the mildew. In the city, they do well, and come to great perfection.

PEACHES.

This fruit is one of the great staples of the State, and I think it may be said, with confidence, that in no part of the world is it produced in greater perfection. The sandy or light soils are preferred for planting the peach tree; but unless the sub-soil contains a certain something that is wanted to perfect the fruit, the trees soon have the appearance of the yellows. On other soils, in elevated districts, where the sub-soil is composed of mica, rotten rock, slate, &c., old trees can be found of healthy appearance, from thirty to forty years of age, and producing good fruit every year. Many fine seedlings have originated in this vicinity, which, I think, when fairly tested, may prove worth cultivation. One or two can be recommended as being superior, and ripening at a season when good peaches are scarce. The "Dulany," a seedling from Heath, I think superior. The "Hunter," shape and size of large "Early York," last of September, equal in flavor to "George IV."

GRAPES.

All the foreign varieties do well in the city lots, where proper care is taken to prune close and attend to them when growing. There have been several vineyards planted in the State, but none, that I know of, are in a flourishing condition. They will succeed here as well as in any other part, provided proper soil, location, and attention be paid to them. No better soil and location need be wanted than can be found on the Gunpowder river, for thirty miles from the city. The fox and chicken grapes are growing in the greatest abundance, and running over the tallest trees.

NECTARINES.

The "Hoffman" nectarine is a seedling raised from a peach-stone, with yellow meat, a cling, and large size. The owner was entirely ignorant of its merits. He is in the habit of planting the stone of any superior fruit he may eat. It is of the size of large "Early York" peach.

STRAWBERRIES.

For market, with me, none have excelled "Hovey's Seedling." "Kean's Seedling," "Alice Maud," "Boston Pine," "Elton," "McAvoy's," "Superior," and "Myatt's Eliza," all produce fair crops and are good fruit. "Iowa," "Black Prince," "Longworth's Prolific," and "Sneicke's Pistillate," may do for fancy varieties. Dr. Edmonson has raised two of great merit, the "Harlem Orange" and "Marylander."

FRUITS OF MASSACHUSETTS.

Statement of Eben Wight, *of Roxbury, Norfolk county, Massachusetts, as reported to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

The committee would call the attention of the society to the following fruits:

PEARS.

Rostiezer, Tyson, Brandywine; always good. Until we can get as good a summer pear as these, no other ought to be recommended for general cultivation.

Beurré d' Anjou—sustains its previous good reputation. On the pear stocks it proves a thrifty, hardy variety.

Buffum—a most valuable old sort, from its vigorous growth and prolific character; if the fruit is gathered early, it is very good.

Alpha—hardy, and a great bearer. Colonel Wilder pronounces it to be among the most desirable.

Howell and *Dallas*—these pears are uniformly fair and handsome, and of excellent quality.

Nouveau Poiteau—a remarkable tree for vigor and beauty of growth. Fruit large, but rather too buttery. This variety possesses all the characteristics of a perfect tree and perfect fruit, which, it is hoped, may be overcome by early gathering and proper ripening.

Zephirine Gregoire, Pie IX., Alexandre Lambre, General Dutilleul and *Comte de Flanders*—promise well as autumn pears.

Fondante de Noel—a seedling of Passe Colmar, ripening earlier than the latter, and of similar flavor, proves to be an excellent late autumn sort.

Grosse Calebasse of Langlier—proves identical with *Beurré Van Marum* (of the Belgians?) *Triomphe du Hasselt, Triomphe de Nord* and *Boutielle.* A fruit of monstrous size, but poor quality; rots badly.

Charles Van Hooghten—large, prolific, possessing good characteristics.

Beurré Sterckmans—maintains its excellent character.

Fondante de Malines—improves, and will probably be a fine sort for general cultivation.

Beurré Superfin—Colonel Wilder says of this variety: "Very handsome, if not the best imported for years, it will take a high rank."

Theodore Van Mons—hardy, profuse bearer, with persistent foliage.

Jalousie de Fontenay Vendée—pretty good.

St. Michel-Archange—tree remarkable for vigor and hardiness, and beautiful in form.

Soldat Laboureur—a splendid tree, fruit large, not fully proved.

Sterling—a fine grower; good early sort.

Laurence—a general favorite.

Kingsessing—recommended for further trial.

Grand Soliel—is a moderate grower, but a great bearer; its quality is good; fruit fair; for orchard cultivation, a desirable variety. Promises well.

De Spoelberg—seems most successful in a dry season.

Walker—very good.

Epine Dumas—"This pear," Mr. Walker says, "improves in my estimation."

Ananas, or Henry IV.—this pear is pronounced by many to be nearly equal to the Seckel in quality.

Columbia—not uniformly good.

Abbott—of this handsome pear we have not had enough experience.

Duchesse d' Orléans—There are various opinions as to its merits. By some it is considered very good.

Elise d' Heyst—has proved poor.

CHERRIES.

Of Dr. Kirtland's cherries, of which several kinds have been fruited by Colonel Wilder, "Governor Wood," "Kirtland's Mary," and "Black Hawk," have proved very fine; and most of the sorts seem hardy here.

Walsh's Seedlings—Nos. 1 and 2, have proved uniformly good.

Hovey Cherry—has proved uniformly good.

Coe's Transparent—is a fruit of great beauty and excellence.

A variety raised by Messrs. Hyde, of Newton, called "Pierce's Late," as a very late cherry promises to be valuable.

RASPBERRIES.

Of the several new varieties raised by Dr. Brincklé, which promise to be valuable acquisitions, we may name the *Orange*, *French*, and *Walker*.

STRAWBERRIES.

Walker's Seedling—(staminate) is a great acquisition; high flavored; bears well.

Jenny Lind Seedling—in the hands of the originator, (Mr. Fay,) has proved good, as a very early variety.

FRUITS OF MISSISSIPPI.

Statement of John C. Jenkins, *of Elgin, near Natchez, Adams county, Mississippi, as reported to the American Pomological Society at their anaual meeting held at the city of Boston in September*, 1854.

A report upon the subject of fruit-growing in the State of Mississippi should properly be prefaced with a few remarks upon the soil and climate.

Soil.—My locality is six miles south of the city of Natchez, between the thirty-first and thirty-second degrees of north latitude. The surface soil is a rich, black, vegetable mould, about 18 inches in depth, resting upon a stratum of hard clay, underlying which is a yellow loam filled with fresh-water shells. This great loamy formation, elevated about two hundred and fifty feet above the level of the sea, extends along the right bank (ascending) of the Mississippi river, from the thirty-first degree of north latitude, as far up as Vicksburg, one and a half degrees further north, and runs horizontally eastward from the river, a distance of twelve to fifteen miles, at which point a marine and fresh water deposit, with recent sea-shells, out crops, followed by the eocene formation of geologists.

Upon the first belt of soil next to the river, (the richest upland in our State,) porous in its texture, abounding in phosphate, and the underlying stratum of loam in the carbonate of lime, the native forest trees

grow luxuriantly, and attain a majestic size. The magnolia, the tulip tree, the sassafras, the black walnut, and several species of the oak, are found from eighty to one hundred feet in height, and having a diameter of from three to five feet near the base. In so rich a soil, the growth of all fruit trees is much more rapid and vigorous than upon the Atlantic slope, and consequently the trees are a longer time in coming into a bearing state.

Climate.—Our winters are generally mild and open; snow seldom falls, or if so, melts away under sunshine in a few hours. We never experience so great a degree of cold as to kill fruit trees. The thermometer has been known to fall as low as 14° F. below zero, but this is very unusual. Our winters are cold enough to give deciduous fruit trees a sufficient period of rest to recruit for another summer's bearing; and this, followed by a spring and summer of so high a temperature as to mature the latest kinds of fruit early in the fall, is all that is wanted, as regards climate, to bring them to perfection. The temperature during the months of May, June, July, August, and September is almost torrid. The thermometer rarely falls under 80°, and often rising to 90° and 95°. Spring frosts occur, but rarely destroy the fruit crop. Long droughts are prevalent during our summer and fall months.

Before noticing the variety of fruits which follow, I must premise that aspect is of high importance with us, and that the best exposure for an orchard is a northern one. I would also state that my ground was well prepared before I planted out the trees; that the specific mineral manures, especially for the apple and the pear, were incorporated in a well decomposed compost, and this spread over the surface of the orchard 2 inches in depth. The ground was then trench-ploughed, followed by a sub-soil plough, and, after planting, the trees kept well mulched during the summer months, and the soil every year cultivated in root crops.

STRAWBERRIES.

This fruit is indigenous to our State. I cultivate the wild variety for its early maturity, ripening the first week in April. I also cultivate the "Black Prince," "Crescent City Seedling," "Hovey's Seedling," and "Large Early Scarlet." All these varieties bear well, and are deliciously flavored. They continue in bearing during two months, May and June.

RASPBERRIES.

I cultivate the "Red Antwerp," "Yellow Magnum Bonum," and "Falstoff." Our climate and soil are favorable to the growth and maturity of this fruit. It continues with me in bearing two months, May and June. The plants require heavy mulching during our hot months.

CHERRIES.

It is rare to find cherries in our Southern States; and the prevalent opinion is, that it will not mature in this climate. As this fruit, it is

well known, was raised in perfection by the ancient Romans in Italy, and as several varieties are at the present day successfully cultivated in the south of Europe, I see no valid reason why it should not succeed with us. I cultivate the following varieties:

Heart Cherries.—"Beauman's May," "Downer's Late," "Early Purple Guigne," "Graffion," "Sparhawk's Honey," "Black Tartarian."

Dukes.—"Belle de Choisy," "Late Duke," "May Duke."

Bigarreaus.—"Monstreuse de Mezel," "Bigarreau Napoleon," "White Bigarreau."

Morellos.—"Butner's Morello," "Rumsey's Late."

My trees in bearing are all upon the Mahaleb stock, and six years old from the bud. They bore abundant crops the spring of 1853; the fruit was perfect in size, and luscious in taste. The "Early Purple Guigne" was especially noted for its large size and delicious flavor. This variety excelled all the others in quality, the "Late Duke" and "May Duke" ranking next. This year, the cherry crop was cut short by a frost when trees were in bloom. I had less fruit, and that of inferior size to the preceding year.

I would wish a longer experience before speaking confidently of success with this fruit.

PEACHES AND NECTARINES.

No region of country upon the globe can exceed ours in the perfection to which these delicious fruits attain, our burning sun developing the saccharine qualities of the peach to the highest degree. Even the yellow-fleshed varieties are with us sweet and sugary, with only so much acid as to be grateful to the taste. I cultivate about one hundred varieties of the peach, and six of the nectarine. Although the Northern varieties are sometimes cut short by frosts, from their habit of late blooming, still the peach may be considered a sure crop in this region. In a period of ten years past, I have never failed in securing a crop. Our State exports largely of this fruit to the New Orleans market. All Northern varieties ripen with me in June and July.

APRICOTS.

I cultivate the "Moorpark," the "Large Early," the "Peach Apricot," and the "Breda." Since planting the trees upon the north side of buildings, I have not failed in securing fair crops of fruit. They ripen here the latter end of May. The ground under my trees is well paved, and the curculio, thus far, has never attacked the fruit.

PEARS.

This fruit has only been recently cultivated to any extent in our State. I learn there are trees yet growing (supposed to have been planted by the early French and Spanish colonists) upon the bluffs south of Natchez, and known as the "Cliff" pear, an indifferent table fruit, and only suitable for cooking. Although in times past it was so rare a sight to see a pear in the fruit orchards of this region, now

that Southern nurseries have been successfully established, thousands and tens of thousands of trees are being annually planted, and our State will, without doubt, in ten to fifteen years from this date, export largely of this fruit to the West Indies and the Northern cities. The intense heat of our summers maturing the pear fully two months earlier than ten degrees north of us, will enable our fruit-growers to supply Northern markets with the finest varieties during the months of July and August. I cultivate over one hundred varieties of the pear. The greater number are dwarfed upon the quince on this stock. Trees six and seven years from the bud have grown from 12 to 20 feet in height, and have a diameter in trunk of 6 to 8 inches. Native trees are greatly to be preferred over imported ones.

Madelaine or Citron des Carmes on Quince.—Trees six years old from bud, 15 feet high, bore heavy crops for the first time this year; flavor juicy and sprightly; quality second rate; ripe 15th of May, and continues in eating one week.

Doyenné d' Eté.—The few specimens I had of this fruit from grafts in standard promise well; higher flavored than Madelaine, and ripens same date; grows vigorously on quince, but trees three years old from bud have not yet fruited.

Bloodgood.—On standard; one of the best early pears; flesh melting and flavor aromatic; quality best; ripens early in June; on quince is a slow grower.

Belle de Bruxelles.—On quince; flavor of fruit only tolerable; quality simply good; ripens early in June.

Beurré Giffard.—The few specimens I had from grafts, in standard, give promise of the highest excellence. A vigorous and rapid grower on quince; trees four years from bud have not yet fruited; ripe in June.

Rostiezer.—On quince; fruit small, but abundant bearer on trees five years from bud; flesh melting, buttery, and of highest flavor; quality best; ripens early in June.

Tyson.—From grafts on standard; fruit medium size; very sugary and juicy, and having a rich aromatic perfume; slow grower on quinces; ripens with me middle of June; quality best.

Passano du Portugal.—From grafts on standard; fruit small and very round, but having a delicate and agreeable flavor; quality good; ripens here last of June.

Summer Franc Real.—On quince stocks; fruit large; flesh melting and sugary; quality best; ripe last of June.

Julienne.—This pear, I think the most desirable for general cultivation in this State of all the summer varieties; fruited with me both on standard and quince. On quince stocks, my trees, six and seven years from bud, have trunks 18 inches in diameter and 15 feet high; vigorous and healthy wood. Trees this year loaded down with fruit; had to thin out, leaving about three hundred specimens on each tree; will ripen in a fruit cellar, if taken from the tree, from the middle of June to the end of July, and continue in eating to the 20th of August; fruit large size; most of my specimens weighed half a pound, and not unlike the Bartlett in shape; ripens in fruit cellar beautifully, turning from green to a rich lemon yellow, surface shining, waxy, and looking as

if varnished; flesh melting, buttery, and rich, and having a most delicate perfume; quality best. Fearing I might be over-estimating this variety, I invited to my house a number of gentlemen who were familiar with the best fruits North and South. I had in eating, at the same time, "White Doyenné," "Bartlett," "Beurré Bosc," "Beurré Diel," "Golden Beurré of Bilboa," "Duchesse d'Angoulême," and some other varieties, but the "Julienne" bore off the palm, without a dissenting voice, for beauty in color, melting qualities, and delicacy in flavor.

Bartlett.—On quince and standard; fruit large, many specimens weighing fully a pound; ripens admirably in fruit cellar long before ripe on trees; is in eating during all July and August; quality best. This pear and the Julienne, I consider the best varieties for market culture in our State.

AUTUMN VARIETIES.

Beurré Diel.—On quince and standard. My trees on quince stocks seven years from the bud, are large and vigorous growers; bear heavy crops; trees this year, thinned out, with one hundred and fifty speci mens on each tree, fruit attains a much larger size than at the North some of my specimens weighing from 1 to 1½ pounds, and a few less than a pound; ripens finely in cellar, turning from green to rich golden yellow; flesh rich, sugary, buttery, and melting; quality best; ripe all July and August.

Golden Beurré of Bilboa.—On quince and standard. Trees on quince, seven years from the bud, have grown vigorously and bear heavily; fruit large, buttery, and melting in flesh, having a rich vinous flavor; quality best; ripens in July and August.

Beurré d'Amanlis.—On quince and standard. Fruit very large, not unlike "Beurré Diel" in size and shape; flesh rather coarse, but buttery and melting; quality very good; ripens in July and August.

Beurré Bosc.—Double worked on quince. Trees seven years from the bud; sparse bearer, so far; fruit large in size; flesh melting and buttery, with rich perfumed flavor; quality best; ripe in August.

Marie Louise.—On quince. Trees six years from the bud, and bushy in habit of growth; so far, sparse bearer; fruit large; flesh very saccharine, and having high vinous flavor; quality very good; ripens in August.

Duchesse d'Angoulême.—On quince. This noble pear, in our rich warm soil and burning climate, attains its highest perfection. Trees on quince, vigorous and rapid growers, six years from the bud, 20 feet and over in height; with me a prolific bearer; had this year to thin out fruit, leaving about one hundred specimens on each tree. Fruit very large, but few specimens under a pound in weight, and many one and a half pounds; ripens admirably in cellar, and is in eating during all July and August; flesh buttery and very juicy, with a rich agreeable flavor; quality, very good.

This variety is a desirable one for market culture in our State. I have taken specimens unripe from the trees the latter part of July, and

carried them by steamer to New York, where they opened sound and ripe on the 10th of August.

Beurré Goubault.—On quince four years from the bud. Bore this year about one dozen specimens each; fruit medium-sized; flesh melting and deliciously flavored with agreeable perfume. I consider it one of the best of the recent Flemish pears; the specimens all sound, handsome, very round in shape and green-colored, when ripe; ripen here last week in July; quality best.

Leech's Kingsessing.—On standards. Fruit large in size; deep sea-green color when ripe; flesh very buttery and melting, and delicate flavor; quality best, and ripens here last of July.

Doyenné White.—On quince and standard. Trees healthy and vigorous growers; on quince, six years from the bud, has borne well; fruit medium-sized—not so large as I have seen at the North; specimens fair and beautiful, without any defect; with me has never cracked; flesh buttery and melting, but not so highly flavored as the Julienne; quality very good; ripens during August.

Doyenné Grey.—The few specimens I have had this year from standard were smaller in size than the same variety at the North. Fruit medium size; flesh melting and buttery, and delicious flavor; skin a lively cinnamon russet; quality very good to best; ripens middle of August.

Dix.—Double worked on quince. So far a sparse bearer; the few specimens I had were large in size, rich, sugary, and melting in flavor; quality very good; ripens in August.

Brandywine.—On standards; a vigorous growing tree; fruit large, finely formed, and uniform size; flesh very melting, with a sweet and rich juice; quality best, and ripens the middle of July.

Bezi de la Motte.—On standards. Fruit large in size, but defective in flavor, and rots at the core; ripe the last of August.

Verte Longue.—On standards. Fruit large in size, very long, pyriform in shape, and bluish green at maturity; flesh very juicy, with sprightly flavor; quality very good; ripe the last of July.

Beurré d'Anjou.—On grafts in standards. Fruit large in size; flesh buttery, melting, and delicately perfumed; quality best, and ripens early in August.

Louise Bonne de Jersey.—On standards. Fruit large; flesh juicy and melting, and highly flavored; quality very good to best; ripens in August.

Seckel.—On quince and standard. Sustains here fully its high reputation.

Fondante d'Automne, or *Belle Lucrative.* Not so large in size as at the North, but is with us a delicious pear, not exceeded by the Seckel for high aromatic flavor; quality best; ripens the last of August.

Vicomte de Spoelberg.—On standards. Fruit large size; color, when ripe, a rich lemon yellow; flesh melting and buttery, and sprightly flavor, with a delicate perfume quality; ripe in August.

Autumn Bergamot.—On standards. A most prolific bearer; fruit rots at the core, and not a desirable variety, thus far, with me.

St. André.—The few specimens I have had from grafts in standards give promise of the highest excellence.

Flemish Beauty.—On standards; fruit large in size, and fair and beautiful in appearance; unless taken from the tree before ripe, rots at the core; otherwise a desirable variety with us; ripe in August.

WINTER VARIETIES.

Winter Nelis.—On quince and standard. A prolific bearer; fruit large; flesh buttery and very melting, abounding in rich aromatic juice; quality best, and in eating with us in October and November.

Chaumontel.—On standards. This capital old variety, in our rich, warm soil, is a highly desirable pear; fruit very large, some specimens weighing a pound; flesh buttery, sugary, and melting, with slight perfume; ripe in October and November.

Glout Morceau.—On standards. Heavy bearer; fruit large; flesh buttery and exceedingly sugary; on the quince, my trees, ten years from buds have not yet borne fruit; the trees are large and growing yet vigorously; ripe in October.

Knight's Monarch.—On quince. The few specimens of this pear I had last November gave promise of highest excellence.

Buerré d'Aremberg.—On quince. Thus far, this variety has rotted badly with me. I have not yet tasted a ripe specimen.

Passe Colmar.—On standards. Heavy bearer, and with me one of the most desirable late varieties.

I have had a few specimens of some of the recently introduced Flemish winter pears, but desire a longer experience before noticing their good or bad qualities in this climate. I would remark, in closing the subject of pears, that the early and summer-ripening varieties are more successfully grown here than the winter ones. The liability of the pear to rot as it approaches maturity may have been one reason why this fruit has been so long neglected in this State. This defect I have, in a great measure, obviated by gathering the different varieties as soon as they have grown to full size, and before they soften on the tree, and ripening them in a cool cellar. My cellar is an inside one; dark, but well ventilated, having double walls. The fruit should be suspended by the stem and not rest on shelves. Another difficulty—the largest and heaviest pears are apt to drop from the trees before maturity, especially during a period of drought. I have this year remedied this by placing barrels filled with soap-suds over the roots of the trees, and allowing the liquid to escape by drops through a small orifice near the lower end of the barrel. I have no doubt, too, that the soap-suds and a handful of guano being put into the barrel has added to the size of the fruit, and kept the tree in high health during the hot months.

APPLES.

This fruit has been generally cultivated in laying out orchards in this State for some twenty or thirty years past. The early and summer varieties succeed well; the trees growing vigorously, and the fruit without defect, and well flavored. The late or winter kinds, are apt to rot and fall from the tree before maturity. I cultivate about one hundred varieties, and have only time and space to notice one which I think surpasses all others in size and flavor.

White Spanish Reinette.—My trees were planted twenty-five years ago, are yet vigorous and healthy, and bear every year heavy crops of excellent fruit. This variety is the "Camuesa" of Spain, where it is said to have been cultivated from the highest antiquity. The early Spanish colonists introduced it to this region of our State. It has become thoroughly acclimatized with us. Fruit, large; some specimens monstrous in size; roundish-oblong in shape; skin smooth, oily, yellowish green on the shaded side to clear yellow; on some specimens, a blush of brownish red next the sun; flesh yellowish, crisp tender, with a sugary and highly aromatic juice; ripens in August, and is in eating a month.

Insects.—In a country where there are few, if any old orchards, insects injurious to the trees are not likely to abound. I have never seen the apple borer with us, and never had a tree to sustain any injury from this insect, or the canker-worm. The peach borer *(Ægeria exitiosa)* is abundant, but its depredations are easily checked. We have, however, an insect which is terribly destructive to our fruit; this is a small brown beetle, known as the carpoxagus, or fruit eater. It is especially destructive to the peach and nectarine, boring into the fruit as soon as it approaches maturity, and thus causing it to rot. It also attacks the pear and apple if these fruits are allowed to remain upon the tree until maturity. This insect has appeared within the last few years, and is becoming every season more numerous and destructive. I neither know, nor have I heard, of any successful plan for its extirpation. I have checked its ravages to some degree in my orchards by burning small torches at night, when many fly into the light and are thus destroyed. I find, too, it avoids the poultry yard, where my fruits have, in a great measure, escaped their attacks.

Additional Notes.—I cannot doubt that the cause of the gigantic vegetable growth upon the formation alluded to in the foregoing report, is due, in a great measure, to the lime in the loamy formation, the stratum being filled with shells partly decomposed, and containing, also, in many places, the bones of extinct mammalia.

I had occasion, a few years ago, to grade off six to eight feet from a few acres of ground in front of my dwelling house, in order to make a level lawn. This exposed the loamy formation (the stratum of black mould and clay above not averaging over four feet in depth.) Upon this loam, I planted the live oak, the magnolia, and other forest trees. They have grown rapidly, and have all a most healthy foliage. Deodar cedars, set out in the spring of 1851, when small, say one foot high, are, by measurements just made, from 10 to 11 feet in height; and Cryptomeria japonica, planted at the same date, does not fall much, if any, below them.

I wished to have said something in my report upon the acclimatization of the varieties of temperate latitudes to a region so far south as this; but I fear it might be misplaced and uncalled for. The pear introduced here more than one hundred years ago, by the French, is a late variety, vigorous in growth, and the specimens sound and healthy, hanging well on the tree until the approach of winter. The "White Spanish Reinette" apple, also a long time since introduced, is marked

by many excellent qualities. I am, therefore, induced to believe that these fruits, being thoroughly acclimatized or re-habituated to our climate, is one cause of their high health. I am now grafting standard pears, with two varieties upon each tree, and from the seeds of these fruits I hope to obtain new and improved varieties, better adapted to the climate than exotic sorts.

In regard to the "Julienne" pear, from the high rank as to quality I have given it in my report, you may be led to think I am deceived in the variety. I am confident I cannot be mistaken. The source from which I originally procured it, and my familiarity with the wood and fruit of the pear, (recognizing them as readily as I would the faces of my children,) convinces me I have the "Julienne" of the books.

FRUITS OF MISSOURI.

Statement of Thomas Allen, *of St. Louis, St. Louis county, Missouri, as reported to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

The Fruit Committee for the State of Missouri have had little encouragement during the present season to make pomological observations. The year 1853 was one of the best fruit seasons we have ever known in the valley of the Mississippi, while the year 1854 will long be remembered for its nipping frosts and severe hail storms in spring, and its long, dreary, and disastrous drought of summer. Scarcely half a crop of any kind of fruit has been produced. Those orchards which partially escaped the frosts which killed the fruit in bud or flower gave us but stinted specimens of half-famished fruit, which have been to a great extent finished by the worm, and prematurely cast.

Since the report of 1849 was made, the fruit-culture has made considerable progress in this State. Many of the best varieties have been introduced, new orchards planted, and the cultivation of the vine and the manufacture of wine largely extended.

Apples, pears, peaches, apricots, nectarines, plums, grapes, cherries, strawberries, and melons find a congenial soil in Missouri, and a climate sufficiently warm. All sorts of fruit trees naturally grow with rather a luxuriant tendency. We have three quite distinct localities for orchards, namely, the river bottoms, with deep alluvial soil; the prairies, with their thick sod and vegetable mould; and the timbered uplands, with their strong loams and clayey sub-soils, underlaid by blueish-white limestone. The earth and the waters contain a considerable portion of lime. Of these soils and localities the rich uplands are proved the best for the success of orchards. The trees make wood rapidly in the bottoms, but small fruit, both in size and crop, and of indifferent flavor. There are some good orchards upon the prairies, but the fruit is inferior to that produced upon the uplands. It attains a large size, and in propitious seasons the crops are bountiful.

The principal difficulties which the fruit-grower has to contend with are late frosts in the spring; the borer, the worm, the Scolytus pyri, and sometimes blight in the apple; the blight in the pear (very destructive about five years ago;) the worm and curculio in the peach (the curl also sometimes injures the appearance of the tree, but the yellows are not seen;) the curculio in the plum, apricot, and nectarine; the bursting of the bark of the cherry tree, and the destruction of the fruit by the wax-wing, or cedar bird; the mildew and rot in the grape, and the mildew in the gooseberry, rendering the cultivation of the the latter, thus far, impracticable. No feasible and adequate remedy has yet been found to overcome these difficulties. Old apple orchards are improved in growth and productiveness by the application of lime. The worm in the peach is partially excluded by the use of lime and ashes around the crown of the roots, but when they get into the body and limbs of the tree, the knife is required to remove them, and the application of hot lye is beneficial. The luxuriant growth of the peach tree renders the shortening-in method of pruning indispensable for its healthiness and longevity.

Annexed is a list of such fruits as are known and have been tried here, with some remarks intervening, classified as I think they deserve. There are many other sorts cultivated, some of them best, and others worthless; and, as observed in a former report, some fruits deemed best where they originated, change their character so much by transplanting them here that they nearly lose their identity. This is more generally the case with fruits from the higher latitudes, and applies principally to the apple. Some of the most celebrated Eastern and European varieties will, we fear, be found unworthy of cultivation. This fact makes experiments necessary to ascertain what sorts are adapted to this climate; and it is confidently anticipated that new native sorts of a superior character will ultimately be developed from the seed. The great majority of our people are emigrants from Europe and from the older States, and the popular fruits of their native lands are in many instances brought with them, while those who are more cosmopolitan, and take the horticultural journals, and read the doings of experienced pomologists, exercise a more comprehensive and enlightened taste, and seek the best new varieties wherever they can find them. But it is probably true that in most of the apple orchards of Missouri "Rawles' Janet," or "Janeting," as it is universally called, is given the precedence, the first selected and most extensively planted. This is, in fact, owing to its invariable productiveness, hardiness, and the long keeping and very good quality of the fruit. There are cultivated tastes, however, which would select the "Newtown Pippin" in preference; but for the general uses of the farmer, I believe the Janeting would receive the highest number of votes in this State.

It is estimated that there are about one thousand five hundred acres planted in grapes in this State, and the manufacture of hock and champagne is increasing. Some of the wine produced here, as taken from the press, has been sometimes bought up by Cincinnati manufacturers. But a home demand is springing up, and one firm in the city of St. Louis, I am informed, manufactured last season fifteen thousand bot-

tles of champagne from the Catawba, and this was their beginning The most extensive vineyards are found, at present, at Hermann, a German settlement, about 80 miles up the Missouri river. The Catawba is the favorite grape as yet, and flourishes best upon the uplands and hill-sides. The crop, when fair, is found very profitable, but the mildew and rot are often very destructive, and vine-dressers, who have little other dependence, then suffer and feel nearly discouraged.

A remedy, or preventive, for the mildew and rot in the grape is a very great desideratum, and eminently worthy of the attention of the American Pomological Society.

A classified list of some of the fruits cultivated in this State is as follows:

APPLES.

Summer Varieties.—Summer Redstreak, Summer Rose, Early Harvest, Golden Sweet, Smith's Summer, Early Red Margaret, Carolina June, Maiden's Blush, Peck's Pleasant, Summer Calville, Red Astrachan.

Summer Calville, wood thrifty; top not very regular; subject to blight; fruit large, oblate; greenish yellow, reddish on one side near the stem; cavity russet.

Smith's Summer—best for drying; wood very thrifty; top regular; a good annual bearer; fruit large, oblate, regular, sweet, juicy.

Fall Varieties.—Rambo, Newark Pippin.

Milam, Fall Pippin, Cooper, White Belle-fleur.

Matson, Reinette of Normandy, Baldwin, Roxbury Russet, Jonathan, Spotted Pippin.

Matson—a large, red-streaked, showy, acid, and juicy apple; good bearer; good for cooking, and very marketable.

Milam—a regular shaped red apple, of medium size and excellent taste; wood thrifty, top well shaped; regular bearer.

Winter Varieties.—Rawle's Janet, Newtown Pippin, Esopus Spitzenberg, Father Abraham, Vandervere.

Lady Apple, Gilpin, Golden Reinette.

Kohl Apple, Yellow Belle-fleur, Red Seek-no-further, Newtown Spitzenberg, Flushing Spitzenberg.

Kohl Apple—a variety imported from Germany. The tree is thrifty, regular top; good and regular bearer; fruit small, regularly shaped; crisp, juicy, and well flavored and good keeper.

Father Abraham—wood thrifty, but thorny; fruit good; size conical; yellow, with a red side; high flavor; good keeper.

The Newtown Pippin, Flushing Spitzenberg, and the Rhode Island Greening have been rejected as unworthy of cultivation here.

PEARS.

Mitchell's Russett, Bartlett, Madelaine, White Doyenné.

Duchesse d'Angoulême, Napoleon, Beurré Diel, Urbaniste.

Mitchell's Russet—a seedling from the Seckel, resembling it in every respect, but of larger size; origin, Belleville, Illinois.

The blight not having been so destructive as formerly, a great many imported varieties of the pear are now planted, but not sufficiently tried.

PEACHES.

"Admirable," "Brevoort," "Heath," "Clark's Early," "Pourprée Hâtive," "Grosse Mignonne," "Walter's Early," "Troth's Early," "Morris White," "Early Newington."

"Incomparable," "Lemon Cling," "Washington Cling," "Soulard Cling," (a native,) "Crawford's Early," "Early York."

"Smock's Freestone," La Grange.

Clark's Early.—A small native red peach, of good appearance, and of lively and decided rich flavor; the earliest on the list; tree of rather slow growth; productive; fruit ripe about the 28th of July. originated in St. Louis, and named by the chairman, in honor of Mr. Lewis Clark, who raised it.

St. Louis.—So called by the chairman. A large yellow peach, native of this county; chiefly valuable for its large size and marketable qualities.

GRAPES.

Open Culture.

Catawba, Isabella, Lenoir, Ohio.

A German grape, called the "Rulander," gives good promise of success in the open air. The Muscadine, and Scuppernong, scarcely succeeds.

CHERRIES.

"Napoleon Bigarreau," "Bigarreau Coleur de Charr," "Bigarreau," "American Amber."

"Bowyer's Early," "Elton," "Black Tartarian," "Black Eagle," "Black Heart."

"Archduke," "Morello."

The present season, from a dozen trees in full bearing, not a "bite of a cherry" was obtained by the proprietor, every vestige of them being appropriated by the birds. They are also attacked by the curculio.

STRAWBERRIES.

The "Early Scarlet" seems to be one of the most popular varieties. "Hovey's Seedling," the "Iowa Male," and "Burr's New Pine" are deemed very good. Many of the newer sorts have been recently introduced. The "Alpines," I fear, will not succeed here.

RASPBERRIES.

Raspberries cannot be said to flourish well in this vicinity. The wants of families, who have gardens of their own, may be supplied by careful attention and cultivation. The raspberry is not often found growing wild here, like the blackberry.

APRICOTS, NECTARINES, AND PLUMS.

The apricot, nectarine, and plum are so generally destroyed by the curculio, that they cannot be recommended for general cultivation until some remedy is discovered. Last year, however, sufficient crops, of a number of varieties, were produced, to exhibit their characteristics and value. But the most perfect products known to the committee were of the "Quetsche," or German Prune, the "Magnum Bonum," the Damson, and of the common "Chickasaw plum." We have never been able to get even a fair crop of the better sorts. The Boston Nectarine and the Moorpark apricot partially escaped the curculio last year, and were very fine. The present season, not a perfect specimen of an apricot nor nectarine has been heard of in the more cultivated parts of the country. There are some localities, however, comparatively new, which the curculio seems not yet to have reached, and in such very fair crops of the more common sorts of plums and nectarines are annually produced without much care.

FRUITS OF NEW HAMPSHIRE.

Statement of B. F. CUTTER, *of Pelham, Hillsborough county, New Hampshire, as reported to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

New Hampshire, in former years, had not been celebrated for culture of fruit of any kind; but, since our State and County fairs have been in operation, a new era has commenced in the business, and an impetus given to it that, in some places, almost amounts to a mania. Information is sought for, and orchards containing the most choice collections are being set in the most approved manner, so that a few years will work an entire revolution. The nursery business remains good, and the nursery men are becoming more experienced, and paying more attention to making choice collections of fruits; yet we have many varieties cultivated of a local character, which are the most serious drawbacks in fruit culture.

APPLES.

The crop of apples the present year, though not large, gave promise of being very good until the severe drought in August caused them to ripen and fall prematurely, which will reduce the yield very much. The curculio, which in former years had been very destructive, has this year almost entirely disappeared; and the apples have been freer from worms than almost ever before, until within about three weeks, at which time the apple-worm made its appearance in great numbers, and are becoming very destructive.

The "Baldwin" apple is, and probably will be for years to come, the most popular market fruit for its season; but the trees, growing on low sandy loam, are very liable to die prematurely, whole nurseries in some instances having been entirely killed, probably on account of

sudden changes in the weather during the winter, while others, within a short distance and located on high gravelly land, have not been injured.

For a small collection of apples besides the Baldwin, I would recommend the following:

Early Bough,	Jewett's Fine Red,
Early Harvest,	John Sweet,
Esopus Spitzenberg,	Orange Sweet,
Foundling,	Porter,
Gravenstein,	Red Astracan,
Hunt, or Golden Russet,	Williams' Favorite.

John Sweet, a new fruit originated in this county, and is the best late keeping apple I have yet seen.

PEARS.

Pears are being cultivated within a few years to a considerable extent, especially in the large cities and towns, and very good specimens have been exhibited at all our late fairs; and, if I may judge by the sale of trees in the State, we shall soon have an abundance of delicious fruit. The crop of fruit the present season, as far as my knowledge extends, is very light, the blossoms having been killed by a severe frost in May.

Having but little experience in the culture of the pear, I furnish no list.

PEACHES.

The peach crop is very uncertain in our State, especially on low land, and the present year is almost an entire failure. From several years' experience in the culture of this fruit, I am satisfied that seedling trees, planted where they are desired to grow, would be the most profitable for a crop, and that by planting the stones from good fruit there is no trouble in obtaining it. I should recommend to head-in thrifty trees, by cutting off from one-fourth to one-half of the last year's growth, as they are much less liable to be broken by wind, snow, ice, or heavy crops of fruit.

The borer, the greatest enemy to the peach tree, may be destroyed by piling ashes about the tree, and digging out the worm.

QUINCES.

Quinces of different kinds have been cultivated to some extent, and fine specimens have been exhibited at all our late fairs; but within a few years, there has been a blight, or an insect, that has nearly destroyed them.

PLUMS.

Plums are cultivated to a considerable extent, and succeed well in all parts of the State; but the curculio and black warts are a great drawback on their cultivation, for which no remedy has been found.

Out of a collection of thirty varieties on my grounds, the following have borne more than any others:

Bingham,	Washington,
Lombard,	White Gage,
Smith's Orleans,	Yellow Magnum Bonum.

The two former are much the best, and the latter fit only for cooking purposes.

CHERRIES.

In the cultivation of cherries, but little has been done as yet, except with an old variety of the "Morello," or "Kentish," which is a very hardy kind, and thrives well all over the State. Many of the new varieties are being set of late, and some of the more hardy kinds are doing very well. Almost every person who buys a cherry tree, wants the "Black Tartarian;" but I would not recommend it for our climate, as the bark cracks and the gum oozes out, which eventually destroys the tree.

The rose-bug is the greatest enemy to the cherry tree that we have to contend with; and not less than eight or ten kinds of birds eat the fruit, which makes the cultivation rather a discouraging business. The crop of cherries the present season was very light, the frost having killed the blossoms in May.

I would recommend the following as among the best for my vicinity, being in the south part of the State:

Black Eagle,	May Duke,
Downer's Late,	White Bigarreau,
Hyde's Black Heart,	Yellow Spanish.
Hyde's Red Heart,	

CURRANTS.

Currants grow, but are cultivated, on scarcely any farm in the State. They might well be termed the neglected fruit, so far as the out-of-town cultivation is concerned. There are, however, many exceptions in the cities and villages, where the better varieties are obtained and well cultivated. The "White" and "Red Dutch" are very good varieties.

GOOSEBERRIES.

Gooseberries of the common varieties have been cultivated by many persons, and they have succeeded well; but the imported sorts are very apt to blight. Some of the common varieties grow to a good size, and yield abundantly. Houghton's Seedling, from Massachusetts, is the most popular kind, and probably worth more than all other kinds we have.

GRAPES.

Of this fruit, we have nothing that we can depend upon for out-door culture but the native varieties, some of which are being sold in large numbers, and ripen almost anywhere. From what experience I have

had in the cultivation of the grape, I am satisfied that it produces better when trained on trees than on a trellis or wall. Good specimens of the Isabella and Catawba are frequently ripened on buildings and walls, especially in the cities and villages, but they are too late for any but warm protected locations.

Wine, of a very good quality, has been made from the native wild grape in this vicinity; and I know no good reason why it might not be made a profitable business.

STRAWBERRIES.

Strawberries, like raspberries, grow wild, and are not much cultivated, with the exception of a few small patches in some of the large towns, &c. Hovey's Seedling, for a pistillate sort, is the most popular kind here. It might be raised in any quantity on some of our new lands, and carried to market by railroad, with very great profit. The next in order are:

Boston Pine,
Wood or Alpine,
Early Virginia.

RASPBERRIES.

Raspberries are not much cultivated, there being an abundance of the wild ones growing almost all over the State. They have succeeded very well on my ground, but need protection in winter. I have cultivated several kinds, but the Franconia is worth more than others which I have proved. It succeeds best on wet land where it is partly shaded.

FRUITS OF OHIO.

Statement of R. Buchanan, A. H. Ernst, *and* J. A. Warder, *of Cincinnati, Hamilton county, Ohio, as reported to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

The climate and soil of our State are so varied, and the fruit in culture so numerous, that a report to embrace catalogues to suit each locality would be too voluminous. From Cleveland, on Lake Erie, in the northeast, to Cincinnati, on the Ohio, in the southwest, a distance of two hundred and fifty miles, there is a difference of near three degrees in latitude, and a great diversity of soil. It is, therefore, difficult to fix a uniform standard of excellence in fruits for the whole State.

Loam and clay, intermixed with lime and sand, are the principal components of our soil, often underlaid by a substratum of gravel, and the greater portion of our State is well adapted to the culture of most of the fruits grown in the Middle States.

The present report will be confined to the southwestern and central parts of our State. The northeastern section having been embraced in previous reports.

APPLES.

The average bearing of apple trees, with us, is four out of five years. Many varieties which are highly esteemed further north do not suit the climate and warm limestone soils of Southern Ohio. The " Rhode

Island Greening," for instance, ripens and casts its fruit so early here as to become a fall apple, and but few are gathered from the trees for winter. The "Alexander," with us, is an early fall apple, and the far-famed "Esopus Spitzenberg" is here a shy bearer, and an unprofitable variety to cultivate. Even the "Baldwin" and the "Roxbury Russet" mature too early, and do not keep so well when as cultivated further north and in cooler soils. The "Belmont," a favorite apple in Northern and Eastern Ohio, with us is subject to crack open, and rot upon the tree in some seasons.

With ordinary care and culture, the apple thrives well in all parts of our State, and, with the exception of the grape, is the most certain bearer of any of our fruits. The following list comprises the most favorite varieties cultivated in this section:

SUMMER VARIETIES.

Benoni,
Bohman,
Drap d'Or,
Carolina Sweet,
Early Bough,
Early Harvest,
Gravenstein,
Maiden's Blush,
Red Astracan,
Strawberry,
Summer Rose,
Summer Pearmain,
Summer Queen.

FALL VARIETIES.

Alexander,
Belmont,
Cooper,
Fakenwalder,
Fall Pippin,
Golden Russet,
Jersey Sweeting,
Monmouth Pippin,
Porter,
Rambo,
Rhode Island Greening,
Wine.

WINTER VARIETIES.

Baldwin,
Black Apple,
Cannon Pearmain,
Danvers Winter Sweet,
German Pippin,
Jonathan,
Lady Apple,
London Sweet,
Michael Henry Pippin,
Newtown Spitzenberg,
Ortley,
Pryor's Red,
Rambo,
Rome Beauty,
Swaar,
White Winter Pearmain,
Wine Sap,
Yellow Belle-fleur.
Yellow Newtown Pippin.

The "Northern Spy" and a few other celebrated varieties give fair promise of doing well here.

PEARS.

Some varieties of this fruit, as the "Bartlett" and "Seckel" bear as well as the apple, and others one year in two or three.

The committee is largely indebted to one of its members, Mr. Ernst, for valuable notes on this fruit, carefully prepared, during a number of years, from his own experience in its culture.

Many varieties, particularly those of American origin, thrive well as

standards; but, as a general rule, the foreign sorts do best on the quince stock. The cultivation is principally in the hands of amateurs, but the high prices obtained for the pear in our markets will soon cause a more general culture, which is invited by our favorable soil and climate. The following are considered best:

Bartlett,
Beurré d'Aremberg,
Beurré Benoist,
Beurré Deil,
Beurré Spence,
Bloodgood,
Dearborn's Seedling,
Dix,
Doyenné d'Été,
Duchesse d'Angoulême,
Easter Beurré,
Flemish Beauty,
Heathcote,
Julienne,
Lawrence,
Louise Bonne de Jersey,
Madelaine,
Maria Louise,
Onondaga,
Osborn,
Pratt,
Saint Ghislain,
Seckel,
Stevens' Genessee,
Stone,
Tyson,
Van Assene,
Washington,
White Doyenné,
Zoar.

The following are rejected, as unsuited to this region, or for inferior size and quality:

Amiré Johannet,
Beurré d'Amanlis,
Beurré Capiaumont,
Chelmsford,
Colmar Neil,
Early Catharine,
Gross Calebasse,
Jargonelle,
Moor's Pound,
Musk Summer Bon Chrétien,
Orange Bergamot,
Petit Muscat,
Red Bergamot,
Rondelet,
Summer Franc Real,
Valle Franche,
Windsor.

PEACHES.

Average bearing every other year, or one out of two or three, in favorable positions. Nearly every variety succeeds here, and our warm suns and soils have provided some splendid specimens in favorable seasons. The worm is kept from destroying the trees by the usual methods—picking out, and placing ashes, lime, or warm manures around the stem of the tree at the root. The latter is preferred, as the peach tree is a great feeder, and requires manure and good culture. With these requisites, no yellows need be feared in this region. It is only necessary to give the following as a few of the varieties in general culture:

Baltimore Rose,
Cooledge's Favorite,
Crawford's Early,
Crawford's Late,
Early York,
George IV.,
Grosse Mignonne,
Jaques' Rareripe,
Late Admirable,
Late Heath Cling,
Morris' Red,
Morris' White,
New York Rareripe,
Oldmixon,
President,
Rodman's Cling.

APRICOTS.

Apricots bear, in sheltered situations, one out of three years. The tree flowers too early for this climate; but on walls and in protected positions it succeeds pretty well.

This fruit, like the nectarine, is only cultivated in amateur gardens. The favorite varieties are the

Breda,
Large Early,
Moorpark.

NECTARINES.

This fruit, with us, is less hardy than the peach and is liable to be destroyed by the curculio. The varieties most in esteem are the

Early Violet,
Elruge,
Golden,
Lewis.

QUINCES.

Three varieties are cultivated here and bear about as well as the apple. The "Orange," the "Pear," and the "Portugal Lemon."

PLUMS.

Most varieties of this fruit bear well here, when protected from the curculio; and in some seasons, when all fruits are abundant, even without protection. Average bearing, three out of four years. The curculio is destroyed by shaking it off in the morning and evening on sheets, or by syringing the tree several times with sulphur and lime water, (five pounds of flower of sulphur and a half barrel of lime to a barrel of water,) or by planting the trees in pavements, or in a well protected chicken-yard, apart from other fruits. The varieties most generally cultivated are as follows:

Bleecker's Gage,
Blue Gage,
Coe's Golden Drop,
Duane's Purple,
Early Orleans,
Flushing Gage,
German Prune,
Green Gage,
Horse Plum,
Huling's Superb,
Jefferson.
Nectarine,
Old Orleans,
Peach,
Prince's Imperial,
Purple Damson,
Purple Egg,
Smith's Orleans,
Washington,
Yellow Egg.

CHERRIES.

Cherries bear, on an average, one out of three years. The climate of Southern Ohio is too warm for this fruit, and but few varieties succeed well here. The best cherry region in our State is the southern shore of Lake Erie, where fine crops are produced almost every year. The rose-bug and the slug, there complained of, do not annoy us here; but the trees of the finer varieties often crack open in winter, after warm wet autumns, and are either destroyed or greatly disfigured.

The western country is largely indebted to Dr. J. P. Kirtland, of

Cleveland, for the production of some very fine seedling cherries, better adapted to the climate than those of foreign origin. The hardiest varieties with us are of the "Morello" family; next are the "Dukes," and least of all the "Bigarreaus."

The following are mostly cultivated:

Belle de Choisy,
Black Hawk,
Black Tartarian,
Downer's Late Red,
Early May,
Early Prolific,
Elton,
Governor Wood,
Kirtland's Mammoth,
Kirtland's Mary,
May Duke,
Mottled Bigarreau,
Napoleon,
Pontiac,
Red Jacket,
Rockport,
White Bigarreau,
Yellow Spanish.

CURRANTS.

Of this fruit, but few varieties are in general cultivation. The kinds principally grown are the

Black,
Red Dutch,
White.

GOOSEBERRIES.

The fine English varieties of this fruit are subject to mildew, unless closely pruned, and planted in ground well drained and highly manured. A small American variety is generally cultivated here.

GRAPES.

This appears to be a favorable region for the cultivation of the grape in vineyards. Within twenty miles around Cincinnati some fourteen hundred acres are planted with the Catawba, our great wine grape. About eight hundred acres were in bearing last year, producing on an average four hundred gallons to the acre, or three hundred and twenty thousand gallons of wine. The average price of the best wine is one dollar to one dollar and twenty-five cents per gallon. The cost of labor in producing the crop, sixty to eighty dollars per acre. The acre planted as usual, three by six feet in the rows, will contain two thousand four hundred and twenty vines.

The average yield for a series of years from vineyards favorably situated and well cultivated, is estimated at three hundred gallons to the acre. Some of our best vineyards, last year, made eight hundred to nine hundred gallons—but that is unusual. This culture is profitable, and vineyards are largely on the increase in the valley of the Ohio.

Grapes under glass are raised by a few amateurs, with about the same success as around the Eastern cities, and of the same varieties; but not to supply the market.

The following are considered best for making wine:

Catawba,
Herbemont,
Isabella,
Missouri,
Schuylkill,
Ohio.

STRAWBERRIES.

The strawberry is cultivated here with very great success, and immense quantities of this fruit are annually sold in our markets—five thousand to six thousand bushels in some seasons.

The most popular varieties at present are

Burr's New Pine,
Extra Red,
Hovey's Seedling,
Hudson,
Jenney's Seedling,
Longworth's Prolific Hermaphrodite,
McAvoy's Superior,
Necked Pine,
No. 1.

RASPBERRIES.

Raspberries are a certain crop. The "Red Antwerp" and the "Ohio Ever-bearing" are the favorite hardy varieties. The "Fastolff" and "Knevet's Giant" are the best of those requiring protection.

FRUITS OF PENNSYLVANIA.

Statement of THOMAS P. JAMES, *of the city and county of Philadelphia, Pennsylvania, as reported to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

The Fruit Committee of Pennsylvania present a report upon the fruits and fruit-culture of the State, from such sources of information as to them became available.

The chairman selected his associates from residents of different portions of the commonwealth, so that the whole might be canvassed, and a full exposition of fruit-culture might be made, appointing one in each of the counties of Chester, Cumberland, Centre, and Alleghany.

Dr. J. K. Eshleman, of Chester county, in a communication dated August 12th, remarks that "the almost total failure of fruit in our part of the State will give us but little experience in new varieties.

"The early spring and subsequent cold—thick ice was formed in the last of April and first of May—destroying most of the fruit, and, in many instances, the trees. Cherry trees have suffered most. Again, the long drought in June, and subsequent extreme heat, caused pears to ripen prematurely, and many to rot on the trees. Madeline, Maynard, Bloodgood, Dearborn, Peche, and Skinless, are already gone. Ott, Tyson. and Brandywine are ripe. In passing, let me say, that with these last, (natives,) the Bartlett and St. Ghislain, we have a succession for near two months which leaves little to be desired. The lists issued in the last report, as worthy of general cultivation and promising well, contain everything that a general cultivator in this section need experiment upon.

"The experience of two years, I regret to say, has added nothing worthy of remark to the knowledge of blight in fruit trees, nor failures of varieties. Unless we have gained some interesting additions, it is

entirely unnecessary to trouble you with a repetition of long catalogue lists."

From a letter, under date August 22, received from W. G. Waring, esq., of Centre county, the following extracts are given:

"I hope that the Pomological Society may continue to flourish and be active. So long as time is required to fully determine the true merits of any sort of fruit, the work of the society will increase, instead of diminish, upon its hands. There will be a great many reconsiderations. The same fruit varies from indifferent to very good, and from being grafted on a different stock. The variations in different seasons is considerable; and another frequent and important cause of uncertainty is the grafting of various sorts upon one tree. In this case, the weaker go to the wall, and cannot possibly show their qualities. We have had but few curculios, and apple-worms, this season. It is to be accounted for, I suppose, by the severe freezing of the latter part of March, after a week or two of warm growing weather. But we have extraordinary swarms of grasshoppers, which have, in many places, stripped large orchards of every leaf. Perhaps they would not have been so numerous, but that the heavy snows of March killed off the birds. The borer has not yet penetrated the mountain ranges so far as to reach our valleys, but is near us on the east. The slug, which eats the parenchyma of the leaf of the pear and cherry, is also approaching us on different sides. The 'cherry knots' are here, or rather were, for they have killed off most of their subjects. The 'plum knots' are close on our borders, in Union and Mifflin counties. They have appeared at intervals during many years, but so far, cutting out has checked their progress."

APPLES.

Of Apples, "Summer Rose," "Summer Queen," "Blush," "Rambo," "Falenwalder," "Belle-fleur," "Rhode Island Greening," and "Spitzenberg," are more admired than any other yet generally known.

PEARS.

Pears generally do well, and bear very uniformly. We have blight occasionally, but mostly appearing in the spring, as the effects of winter. It is more frequent on trees grown from sprouts which have lateral roots, but more destructive on seedlings, when they happen to make a very late and luxuriant September growth. The large quince trees are affected by fire-blight this season. It seldom appears on the pear or apple. "Madeline," "Bloodgood," "Dearborn," "Julienne," "Bartlett," "Butter," "Seckel," and "Nelis" are always ready; when the season comes, always fine; but we have many kinds to prove here yet.

CHERRIES.

Cherries of all kinds grow and bear here admirably, and answer the description generally given, excepting that the "Elton" is as hardy as any, and a first-rate fruit. "Black Eagle" is, in some seasons, the richest of cherries, in others not so fine. Among new sorts, "Reine

Hortense" and "Belle Magnifique" are very fine and valuable; the former is a large, light-colored cherry, cotemporary with "Black Eagle;" the latter ripens in wheat harvest, and has just the quality of of acidity and slight astringency that are especially refreshing at that season. It is of the largest size though a "Duke."

PLUMS.

The larger plums rot very badly. When the showy crop is just ready to mature, the rot comes, and takes nearly all, and that both in wet and dry seasons. The "Galbraith Plum," (native,) is decidedly the finest, and very productive. The "Early Yellow Prune" comes somewhat later, and is the most productive of all. "Prune Damson" is worthy; "Green Gage" does not rot, but sometimes fails to mature, yet it is a *sine qua non.* "Lawrence" does very well, but rots to some extent. A large, late purple plum that we have here, is in all respects decidedly the finest and most profitable late variety we have. It is not described in the books, but is much such a fruit as "Domine Dull" is represented to be in Downing's Fruit Trees, but much larger, of excellent flavor, very rich and a free stone. The lists of pears and plums that I make here would by no means content me; there are many sorts, with some fine qualities that I could not find in others, and could not voluntarily surrender. I am a believer in having plenty of good fruit and ample variety.

PEACHES.

Of peaches, we can occasionally raise crops, of such sorts as "Crawford's Early," "Yellow Rareripe," "Morris White," "Early York," "Crawford's Late," &c., but they are all much more uncertain than seedling trees. When the trees are unaffected by the yellows, or other diseases, or severe injury from worms, they attain a large size, and an age of fifteen to thirty years.

SEEDLING APPLES.

The William Penn.—A native of Columbia, Lancaster county, from J. W. Houston. Rather large, roundish oblate, slightly conical; color greyish, delicately mottled, and striped with red on a yellowish ground, with numerous white specks, in the centre of which is a minute russet dot; stem short, not very stout, sometimes fleshy, inserted in an open, rather deep, russetted cavity; basin sometimes wide and shallow, usually narrow, rather deep and furrowed; flesh greenish yellow, juicy, with a delicious Spitzenberg aroma; quality very good, if not best; represented as being an abundant bearer. Tested in February.

The Boalsburg.—From William G. Waring, of Boalsburg, Centre county; a large, oblong apple, inclining to conical, delicately mottled, and striped with red on a yellow ground; stem short, thick, inserted in a deep, acuminate, russetted cavity; basin deep, moderately wide flesh yellowish, juicy, sprightly, and refreshing; quality very good. Ripe in February.

The Hector.—A native of Chester county; large, oblong, conical, striped, and mottled with red on a yellow ground; stem three-quarters of an inch long, slender, inserted in a deep, open, russetted cavity; basin narrow, deep, furrowed; flesh crisp; texture fine; flavor pleasant; quality very good.

The Hess.—A native of Conestoga, Lancaster county; size, medium; form, variable, sometimes roundish, often conical; red in stripes of different hues; stem short, rather stout; cavity narrow, moderately deep, slightly russetted; basin deep, narrow; flesh greenish white, tender; flavor agreeably aromatic; quality very good. Eaten in March.

The Adams.—Originated with James Adams, of White Deer township, Union county; large, roundish oblate; faintly mottled, and striped with red on a greenish-yellow ground; stem half an inch long and one-ninth to one-sixth of an inch thick; cavity broad, acute; calyx rather large; segments closed; basin wide, moderately deep plaited; flesh greenish white, of fine texture, rather juicy; flavor pleasant; quality very good. Tested in April.

The Major.—Originated with Major Samuel McMahan, of Northumberland county; size large; roundish; red, sometimes blended with yellow in the shaded side; stem variable in length, of medium thickness; cavity rather wide, moderately deep; basin uneven, shallow; flesh yellowish, crisp; flavor pleasant, agreeably saccharine, and resembles in some measure that of the "Carthouse," to which, however, it is superior; quality very good. Tested in April.

The Neversick.—Was found growing among the brush on the side of the Neversick mountains, in Berks county. Although not 5 feet high when discovered, its branches contained two bushels of fruit, of most attractive appearance. Large; roundish exterior of an exceedingly beautiful waxen yellow color, with a few russet dots and a delicately striped and richly mottled carmine cheek; stem very short and rather stout; cavity narrow, acuminate, shallow; calyx large; basin deep, rather wide, furrowed; seed greyish yellow, acute ovate; flesh yellowish, somewhat tough, owing, probably, to the fruit being much shrivelled; flavor approaching that of the pine-apple; quality very good. Eaten in April.

The Marks.—From the premises of Mr. Marks, Berks county; size medium; roundish, tapering slightly to the crown, and somewhat angular; yellowish white, with a few russet dots, and nearly covered with a faint orange blush; stem half an inch long, a twelfth of an inch thick; a cavity narrow, deep, acuminate; calyx small, closed; basin narrow, tender, fine, slightly russetted; seed yellowish grey; flesh whitish, rather deep texture; flavor delicately perfumed; quality very good, if not best.

The Jenkins.—A native of Montgomery county; originated with John M. Jenkins, of Hatfield township; fruit small; roundish ovate; red, interspersed with numerous large white dots, on a yellowish ground; stem more than half an inch long, slender; cavity deep, rather wide, sometimes russetted; calyx closed; basin deep, open, furrowed; core above medium; seed greyish brown, acute-ovate; flesh white, tender, fine texture, juicy; flavor agreeably saccharine, exceedingly pleasant and aromatic; quality very good, if not best.

The York Imperial, or Johnson's Fine Winter.—Very suitable for the table at evening entertainments; said to be a native of York county; size rather below medium; truncated, oval, angular; the unexposed side is mottled and striped, so as to present a greyish-red aspect on a greenish-yellow ground, and on the sunny side the color is a dull crimson; stem short, and moderately stout; cavity wide and rather deep; calyx small and closed, and set in a deep, wide, plaited basin; flesh greenish white, tender, crisp, juicy; flavor pleasant and agreeably saccharine; quality at least good, to many tastes very good.

The Red Apple originated with Mr. Haines, of Princeton, Berks county. Below medium size; roundish oblate; skin thin, striped, and marbled with bright red, and marked with numerous whitish dots near the crown; stem long, rather slender, inserted in an open deep cavity; calyx large, set in a wide, rather deep, slightly plaited basin; the bright-red stripes remain imprinted on the fruit after the delicate skin has been removed, the coloring matter penetrating and partially staining the otherwise whitish flesh, which is exceedingly tender, and of a fine texture; flavor agreeable; quality very good; eaten in April.

The Boas Apple.—From Exeter township, Berks county, taken to Oley fifty years since by Rev. Mr. Boas, Size medium; roundish oblate; deep crimson, in stripes of different hues, with one or more whitish yellow blotches near the base—sometimes only faintly striped with red, on a greenish-yellow ground; stem very short and thick, inserted in a moderately deep, not very wide, cavity; calyx set in a plaited basin, variable in form and size, sometimes superficial and wide, sometimes rather deep and narrow; core small; seed very small, plump, acuminate, greyish brown; flesh yellowish white, crisp; flavor pleasant; quality very good; said to be a long keeper.

The Bush.—A native on the farm of Christian Dale, near Boalsburg, Centre county, found growing in the woods. Mr. Waring says: "This variety is an excellent bearer, and a great favorite in an orchard of choice sorts." Size, two and three-quarters by three inches; oblate inclining to conical; greenish yellow, with many russet dots near the crown, and occasionally a faint blush; stem seven-eighths of an inch by one-ninth, inserted in a deep, open, furrowed cavity; calyx very small, set in a deep, narrow, plaited basin; seed brown, broad, short; flavor pleasant; quality very good. Tested in September.

The Ritter.—A native of Exeter township, Berks county. Size, two and a half inches long by two and seven-eighths broad; roundish oblong; red, in stripes of various hues, with many large white dots; stem short and moderately stout, inserted in a deep, narrow cavity; calyx medium, closed, set in a deep, rather wide basin; seed very short, plump, light cinnamon; flesh tender; flavor fine; quality very good. October.

A Seedling—grown near Reading, Berks county. Size, below medium, two and a half inches long by two and three-fourths broad; form roundish; color greenish yellow, with a brown flush; stem variable, from five-sixteenths to five-eighths of an inch long, and one-twelfth thick, inserted in a deep, narrow, acuminate cavity; calyx large, closed, set in a deep, rather wide, obscurely plaited basin; seed light brown, broad, flat; flesh fine texture; flavor delicately aromatic; quality very good. December.

The Water.—Originated in pleasant valley, Berks county; from Charles B. Ott; represented to be a very productive variety. Size, medium, two and a half inches long by two and five-eighths broad; form oblong, inclining to conical; color red on the greater part of the surface, interspersed with one or more white spaces, and a number of green blotches, greenish yellow about the crown and on the unexposed portion; stem half an inch long, and one-twelfth thick, inserted into a rather narrow, deep, acuminate cavity; calyx medium, closed, set in a moderately wide, plaited, sometimes shallow, occasionally deep, basin; seed medium, brown, ovate; flesh greenish white, fine texture, remarkably tender, juicy; flavor sprightly, with an agreeable aroma; quality very good. January.

Cocklin's Favorite.—From Jacob Cocklin, of York; a native of Allen township, Cumberland county. A small, roundish, truncated apple; quality very good.

People's Choice.—A native of Chester county; from J. M. Thorne. A small red apple, with peculiar markings; quality very good. A November fruit.

The Yost.—From Charles Kessler, of Reading, Berks county. Size, rather large, two and three-quarters to three inches long by three and three-eighths to three and three-quarters wide; roundish, oblate; beautifully striped and delicately mottled with crimson on a yellow ground; stem short, less than a quarter inch by one-seventh thick, inserted in a wide, deep cavity; flesh yellowish, tender, juicy; pleasant flavor; quality very good. December.

Long Stem.—From the same source. Size below medium, roundish, oblong, sometimes angular; skin red in faint stripes, with a number of grey russet dots; stem long, thin; cavity medium, acuminate; basin small, shallow, plaited; flesh greenish white, tender; agreeable sub-acid flavor, with Spitzenberg aroma, quality very good. Not the "Long-stem" of Cole.

The Yacht.—From Peter Kuser, Boyntown, Montgomery county. Size medium, roundish, striped with red of various hues on yellowish ground; stem half of an inch long, one-eighth thick; cavity open, obtuse, basin very shallow, plaited; flesh fine texture, tender, pleasant flavor; quality very good.

Houssum's Red.—From Mr. Houssum, of Reading, Berks county. Size large, oblong, compressed at the sides, red in stripes, yellow at the base, stem short, thick; cavity narrow, not deep, slightly russetted, basin moderately deep, plaited, flesh fine texture, tender, with delightful aroma; quality very good at least. October to February.

Bucks County Pippin.—Size large, roundish oblate, inclining to conical; greenish yellow, with sometimes a faint brown cheek; stem short, not stout, inserted in a deep open cavity; basin wide, deep, slightly plaited; seed small, short, flesh tender; texture fine; flavor excellent; quality very good.

Evening Party.—From Charles Kessler, Reading, Berks county. Size small, roundish oblate, nearly covered with red in stripes on a whitish-yellow ground; stem short, inserted in a wide deep cavity; calyx small, closed; basin wide, moderately deep; flesh yellowish

white, tender, with a spicy saccharine flavor; quality very good. Well adapted for the table at evening parties.

The following list embraces seedlings which are considered good:

White Spitzenberg.—A native of Chester county. A constant and prolific bearer. The fruit will keep until March.

Bechtold's Seedling.—From Berks county. In season from October until March.

The Keim.—A native of Berks county held in estimation.

The Krowser.—From the same county.

The Sink.—From Centre county, remarkable for its constant and abundant yield of fruit; in great demand for cooking purposes, and in constant use from July to October.

The Summer Belle-fleur.—From Centre county, excellent for baking.

The Mauch, the Lecher, the Long Keeping, the Giant.—Originated with Peter Kuser, Montgomery county. In some repute.

The Hepler, the Zeiber.—Both originated in Reading, Berks county.

The Kurr.—A native of Bethel township, Berks county.

The Orange.—Originated by N. Lott, of Reading, Berks county.

The Ohlinger.—From Mr. Ohlinger, Alsace township, Berks county.

The Alsace, the Dumpling, the Pfuffer, the Speckled Oley.—Originated Berks county.

The Freeze and Thaw.—Grown by Mr. Gorgas, Roxbury, Philadelphia county.

The Buyer's Seedling.—From Union county.

The Crawford.—From Montgomery county.

SEEDLING PEARS.

The Reading.—Believed to be a native of Reading, Berks county; size medium, pyriform, tapering to the crown; skin greenish yellow, with numerous russet dots; stem an inch long, slender; basin narrow and superficial; flesh greenish white, abounding in juice; of a mild and agreeable flavor; quality at least good; tested in January.

The Diller.—From Dr. I. K. Eshleman, Lancaster county. Size below medium; roundish-ovate, with one or more of the longitudinal depressions or sutures seen in Dearborn's Seedling; skin cinnamon russet; stem an inch to an inch and a half long, by one-seventh thick, inserted by fleshy rings without depressions; calyx open, set in a shallow, rather wide basin; seed small, dark, with an angle at the blunt extremity; flesh somewhat granular, buttery; possessing a fine perfumed flavor; quality very good; period of maturity the last of August.

A Supposed Seedling.—From Robert Buist, bearing some resemblance in form and flavor to Henry IV. Rather small, two and an eighth inches long by one and one-eighth broad; obovate pyriform; yellowish green with large green russet spots and blotches, and a brownish-red cheek; calyx closed, set in a shallow, furrowed basin; seed small, black; flesh melting, buttery, of fine texture; flavor vinous; quality very good.

The Feaster.—Originated about 70 years ago with Aaron Feaster, of Northampton township, Bucks county; having sprung up on a piece of ground used as a meadow. Mr. Feaster designated it the

"Meadow Pear;" it is known as the "Bleecker's Meadow" in horticultural works; but its merits have not been properly appreciated. By some it is called the "Heidelberg" pear. It is known in Philadelphia market as the "Spice" or "Spice Butter." No published history or record of its origin has been given. The original tree is still standing, and continues to bear most abundantly; some seasons it has yielded five bushels of fruit, which have sold for $40. Although rather coarse in texture, and somewhat gritty at the core, when properly house-ripened, it is rich, melting, delicious, and in quality very good. October is its period of maturity.

SEEDLING PEACHES.

Several fine varieties have originated in Lancaster county, by Dr. H. A. Muhlenberg, one called the "Early White," and a few of large size and remarkably fine flavor. "Early Rareripe," more acid, a free, also. "Lancaster Yellow Rareripe," large, free, very juicy, and of good flavor.

Isaac B. Baxter, of Philadelphia, has raised a good variety called "Jane," very large, and of delicious flavor, quality very good.

Mr. Lott, of Reading, has originated one of merit; size large, three inches long by three and one-eighth broad; roundish; dark red on a greenish-white ground; suture distinct, extending more than half round; cavity moderately deep; flesh white, red around the stone, juicy, unadherent, delightful flavor, qualities very good, if not best.

The Gorgas.—Originated with Benjamin Gullip, in Philadelphia, from a stone of the "Morris White;" size two and a half inches by two and three-quarters; roundish, with a slight prominence at the apex; dull greenish-white, clouded and blotched with red on the exposed side; cavity wide, rather deep; stone free; flesh whitish slightly stained at the stone, juicy; flavor saccharine and exceedingly luscious; quality best; period September.

SEEDLING PLUMS.

Thomas' October.—A native of Upper Dublin Township, Montgomery county; size medium; pale red; quality good.

Early Yellow Prune.—Originated in Bedford county; size one and five-eighths inches by one and one-quarter; oval, pointed at each end; stem five-eighths of an inch long by one-twentieth thick; flesh free from the stone; flavor delicious; quality very good; a free grower, prodigious bearer, and not apt to rot.

Red Prune.—From Bedford county; known in Lancaster under the name of "Bottle Plum;" size, two inches long by one and one-eighth broad; pyriform with a long slender neck; suture extending, on one side, from the base to the apex; pale red; stem one inch long by one-sixteenth thick—a handsome plum, of peculiar form and good quality; indifferent bearer.

The Galbraith.—An early plum, said to have originated with the late Mr. Galbraith, near Boalsburg, Centre county, is represented as being a straggling grower, but the early plum cultivated in that

vicinity; size, an inch and one-half by one and five-sixteenths broad; oval; purple; stem five-eighths of an inch by one-fourteenth; flesh tender, juicy, adherent to the stone; flavor luscious; quality very good, if not best.

Prune Damson.—From Centre county; size, one and a half inches long, one and three-sixteenths wide, one and one-sixteenth thick; flattened oval; blue; stem one and a half inches long, by one-eighteenth thick; flesh rather dry, entirely free from the stone; flavor agreeable; quality good.

Peach Plum.—Cultivated at Boalsburg as that variety, but differs from it in several particulars; size large, one and three-quarter inches by one and nine-sixteenths; oblong; salmon color; stem three-eighths of an inch by one-fourteenth; stone adherent; long obovate, one and one-sixteenth inches long, five-eighths wide, and seven-sixteenths thick; of pleasant flavor; quality between good and very good.

Cleavinger.—A native of Philadelphia county; a purple variety, of the largest size, and of good flavor.

Cope's Seedling.—Raised by John Cope, of Southwark, Philadelphia; size large, an inch and three-quarters long by one and a half broad; long oval; dark purple; stem three-fourths of an inch long, slender; flesh not very juicy, free from the stone, flavor acid; quality good for culinary purposes.

A *cling* variety of the Red Magnum Bonum, from Samuel Montgomery county; size very large; oval; purple; stem five-eighths of an inch long by one-twelfth thick; quality good.

Bingham Plum.—From Alexander Parker, Philadelphia; size large; truncated oval; greenish yellow, occasionally with carmine dots on the exposed sides; suture on one side extending from the base to the apex; stem three-quarters of an inch long by one-twelfth thick, inserted in a deep narrow depression; stone adherent; flesh yellowish, juicy; flavor pleasant; quality very good.

SEEDLING CHERRIES.

The Conestoga.—Orginated in Conestoga township, Lancaster county; size large; obtuse heart-shaped, slightly indented at the apex; dark purple; stem from an inch and three-quarters to two and a quarter long, slender, inserted in an open cavity; flesh purplish, firm; flavor sugary and very pleasant; quality best.

SEEDLING GRAPES.

Several fine grapes have been raised by Peter Raabe, of Philadelphia, from seed obtained from Germany, which have proved hardy, and are varieties of merit:

The Brincklé.—Bunch large, rather compact, sometimes shouldered; berry five-eights of an inch in diameter, round, black; flesh solid, not pulpy; flavor rich, vinous, and saccharine; quality best.

The Emily.—Bunch large, not very compact, occasionally shouldered; berry below medium, from three-eighths to a half of an inch in diameter; round, pale red; flesh very juicy, with little or no pulp; flavor saccharine and delicious; quality best for an out-door grape.

The Clara.—Bunch medium, not compact; berry medium; round; green, faintly tinged with salmon when exposed to the sun; flesh tender, juicy; flavor rich, sweet, and delicious; quality best.

The Raabe.—Bunch small, compact, rarely shouldered; berry below medium; round; dark red, thickly covered with bloom; flesh very juicy, with scarcely any pulp; flavor saccharine, with a good deal of the Catawba taste; quality best. This is doubtless a seedling from the Catawba, as Mr. Raabe had that variety in fruit at the time he sowed his bed.

William Graham, of Philadelphia, has cultivated an accidental seedling of excellent qualities. It is called the "Graham;" bunch medium, shouldered, not compact; berry half an inch in diameter, round, purple, thickly covered with blue bloom; contains little or no pulp, and abounds in a saccharine juice of agreeable flavor; quality best. Supposed to be a cross between the "Bland" and "Elsinborough."

The Cassady.—An accidental seedling, white variety, with native leaf and dark-purplish wood, that sprung up in Mr. Cassady's yard, Philadelphia, in 1847, and fruited in 1852. Bunch medium, tolerably compact, and sometimes shouldered; berry below medium, five-eighths of an inch in diameter; form round; color greenish white, with occasionally a faint salmon tint, and thickly covered with white bloom; flesh juicy, with but little pulp; flavor pleasant; quality very good.

The Kilvington.—Mr. Cassady bought this seven years ago for the Isabella, from which it differs materially. Bunch medium, compact; berry below medium, five-eighths of an inch in diameter; form round; color red, a shade deeper than the Catawba, with much bloom; seed unusually large; flesh contains some pulp, which is not tough, but half tender and melting; flavor vinous and saccharine, without any Caawba t aste; quality best.

SEEDLING STRAWBERRIES.

There have been a few seedlings brought into notice; those possessing greatest merit have been originated by Gerhard Schmitz, of Philadelphia, which he called the "Moyamensing" and the "Pennsylvania," which have proved well worthy of cultivation, being prolific and of excellent flavor.

FRUIT-CULTURE IN CENTRE COUNTY, PENNSYLVANIA.

BY GEORGE BUCHANAN, SAMUEL GILLILAND, JAMES T. HALE, DAVID DUNCAN, AND WILLIAM P. FISHER, BEING THAT PORTION OF THEIR REPORT WHICH RELATES TO FRUIT CULTURE TO THE CENTRE COUNTY AGRICULTURAL SOCIETY.

The great pleasure and profit arising from a choice collection of fruit is of late becoming somewhat appreciated in our county. Although the propagation of fruit by grafting was almost neglected until lately, many fair orchards are now springing up among us, bearing fruit

which would compare with any probably produced in the State. Centre county, before long, will most likely be a great fruit-growing region, the soil and situation of many parts of it being peculiarly adapted to fruit-culture, particularly the Alleghany ridges which pass through the northern part. It comprises a soil of chocolate slate admirably adapted to fruit trees. This situation, being higher than the valleys, is more secure from late spring frosts. All the noted varieties are grown to some extent among us and brought to considerable perfection, as was manifest at our late agricultural fair, at which place the remark was made by some present who had attended the great State fair, that the show of fruits was nearly equal to what they had seen there. But yet a great number of our farmers neglect to plant and properly attend to their fruit trees, not being aware of the fact there is no other labor to be done on a farm which will in due season remunerate them better than that expended in fruit-culture. How many side-hills and rough portions do we see, which might with but very little expense and a proper share of care be covered with rich fruit.

Those who desire to raise a young orchard should bear in mind that their success depends very much on the manner in which they plant their trees, and the care they receive for the first few years after planting. Many are beginning to observe that to have success in planting, they must dig the holes 3 or 4 feet wide, and much wider is better, and deep enough to admit some surface soil before the tree is set, filling up entirely with surface or rich soil, rejecting that taken from the lower part of the hole in digging, and to securely stake each tree.

Spent tan-bark has proved with us to be a good material to mulch newly-planted trees, as it retains a great deal of moisture, and may prove somewhat effectual against insects, as they appear to have an aversion to it. As mulching is exceedingly beneficial to insure the growth of the tree in planting, we would recommend spent tan-bark in all situations where it can be conveniently obtained. The growth of a young orchard may be greatly increased by cultivation, permitting no grass to grow near the trees, digging up the soil for some distance around, and manuring once a year.

Our young apple orchards here are much annoyed with the borer, a worm somewhat similar to the common sawyer. In large trees, they are generally found near the surface of the ground, under the bark, or in the outer sap-wood; but in young trees, they frequently pass through the centre of the trunk and continue their depredations until the tree dies, or breaks off with the wind. Probably the best remedy is to apply fresh lime or ashes to the roots of the trees, and a heavy coat of whitewash to the trunk in the early part of summer. The insect, while in the perfect or flying state, deposits its eggs in the bark, near the surface of the ground, which, if kept covered with a very heavy coat of whitewash, would be greatly retarded, if not entirely prevented from depositing its eggs. On small trees, it might be best to apply the whitewash 18 inches or 2 feet above the ground only, as it is too severe to the bark of a young tree, and apply soft soap to the remainder of the trunk, which will loosen any moss that has adhered to the bark, and greatly promote the health and beauty of the tree.

FRUIT-CULTURE AT THE SOUTH.

BY J. VAN BUREN, OF CLARKSVILLE, HABERSHAM COUNTY, GEORGIA.

Within the last three years, public attention has been directed to fruit-culture in this section with more enthusiasm and success than it had at any previous period. A new feature of the science has presented itself, which hitherto had not received the attention it merited, and which thus far has fulfilled the expectations of the most energetic and sanguine experimenters. This is the substitution and production of seedling varieties raised here, together with Southern-raised trees, in lieu of Northern-raised ones, as heretofore practised, which are found to be more productive, vigorous, and less liable to diseases than those from the North.

In reply to the interrogatory, "What varieties of summer, fall and winter fruits are cultivated with the best success?" I will commence with the *Apple*, which hitherto has been deemed a fruit peculiarly Northern, and one that could not be successfully grown in our Southern climate, but which opinion is now demonstrated to be erroneous. Many choice varieties have, from time to time, been discovered on places and farms once owned and cultivated by the Creeks and Cherokees, previous to their removal to the country they now occupy. These specimens are all seedling fruit, as they either knew nothing of, or never practised the art, of engrafting to propagate desirable varieties as we do; for the same kinds have never been discovered in more than one place which had been occupied by them. Researches have been prosecuted in a southerly direction in this State as far as Thomas county, and in Alabama as far as the region of Montgomery. The result has been, one valuable variety has been found in the former place, and three in the latter, one of which is a valuable acquisition, being a winter variety, ripening and remaining upon the tree until January. This apple is known as the "Carter," having been discovered by Colonel David Carter, of Montgomery. These facts will doubtless have the effect in time to render the Southern States a great fruit-producing country, as it is now well known that we can and do now produce, of great excellence, the orange, the lemon, the fig, the pomegranate, the peach, the apple, and the pear, besides others of minor note.

Of *Apples*, we now have the following kinds under extensive propagation, trial, and culture, ripening in succession from June to January: "Red June," "Striped June," "Horse," "Wonder," "Julien," "Bruce's Summer," "Habersham World's Wonder," "Cullasaga," "Nickajack," "Summersour," "Buff," "McDowell's Sweet," "Cumako Sweet," "Nix's Green," "Allen's Sweet," "Byers," "Watson," "Gordon's Seedling," "Mavarad's Sweet," "Berry's Seedling," "Shockley," "Wall," "Lever," "Mead's Late Keeper," "Aromatic," "Walker's Yellow," "Red Warrior," "Nantahala," "Dishawon," "Tender Skin," "Neverfail," "Ducket," "Mangham," "Hall," "Bouseur," "Talpehocken," "Elgin," "Limbertwig," "Thurmound," "Southern Golden Pippin," "Taunton," "Fall Pippin," "Mountain Sprout," "Cranberry," "Eastaboa," "Tigner," "Gordon's Seedling," "Rome Beauty, "Gully," "Buckingham," "Chestatee," "Carter,"

and "Selma." Besides these, could be added the names of some fifteen or twenty others, embraced in the catalogues of our nurserymen, of the character of which I have no personal acquaintance. With the above-named, I am personally familiar in most instances, and hesitate not to speak with the utmost confidence of the superior character of many of them for size, flavor, and long keeping. The "Red June" frequently produces two crops in a season, the second being sparse as compared with the first, and is most usually arrested in its growth by the autumnal frosts; at other times, when frost occurs late in the season, the fruit grows to an average size.

In addition to those found in the old Indian settlements, are many originated by enterprising individuals, together with others, which have accidentally sprung up and been brought into notice; and with the present enthusiasm existing for the cultivation and production of new varieties, it is but reasonable to suppose many desirable acquisitions will be added from year to year. Efforts are being made along the lines of our railroads to establish large orchards, for the avowed purpose of supplying the Atlantic cities, both North and South. The same spirit of fruit-growing is also manifested along the shores of the Alabama and Mississippi rivers for the supply of the cities of Mobile and New Orleans. I am credibly informed of the existence of a single peach orchard in the vicinity of Natchez, Mississippi, containing ten thousand trees, which, last year yielded an income of some \$600 to \$800 to the acre, while I know of others in progress of large dimensions in our own State, with equal prospect of remuneration. Many planters are also commencing the business with energy for the sake of supplying their families and negroes with the luxury of an abundance of this healthy aliment. Dr. William O. Baldwin, of Montgomery, informs me he has an orchard under cultivation consisting of 2,000 apple trees, 1,300 pear trees, and 2,000 peach trees, with other varieties of fruit in proportion. To the enterprise of the above-named gentleman, I am indebted for several native varieties of apples and peaches originated or discovered by him in his vicinity.

The *Pear* thrives better and more kindly in the Southern than in the Northern States, the climate being more congenial to its nature. Some varieties are predisposed, in favorable seasons, to produce two crops of fruit, as the English "Jargonelle," "Belle Lucrative," and other early varieties almost uniformly do; and it is highly probable, a few degrees southward of us, many other kinds may be added to the number. This species of fruit will soon find its way to our Northern cities far in advance of the time it arrives in perfection in their vicinity, promising a profitable return to those engaging in its culture. It can and soon will be as plentiful as apples and peaches are in their season, as the trees grow here with great vigor and rapidity, and with the fact of making the first growth of perfect wood by July, and then producing fair fruit upon the same wood, is sufficient proof that no fears need be apprehended of an immature growth in the fall. Here, as at the North, the the tree is somewhat subject to the disease known as the "blight," but I think that it is not so prevalent as it is there. We have a few native seedlings of merit with us, such as the "Horton" and "Green Chester," which will favorably compare with the best of foreign origin;

and I will here take the occasion to call cultivators to the practice of sowing the seeds from fine foreign varieties grown in our Southern soil, as an earnest for originating varieties entirely exempt from the above-mentioned disease. This fruit, also, being less subject to the depredations of insects than any other, should render it an object of general cultivation.

The *Peach* may be esteemed almost indigenous to the Southern States; springing up and growing from seed to the production of fruit in three years, in hedge-rows and fence corners, wherever accident may have deposited the seed. Not many seedlings of merit have yet been brought to public notice, except one called the "Pace" or "Tinsley," a magnificent fruit, growing to the enormous size of 13 inches in circumference, and weighing a pound and over; and another called "Baldwin's October Free," originated by Dr. William O. Baldwin, of Montgomery, which is worthy of high estimation, ripening its fruit from the last of October to the middle of November with the unusual property of keeping sound until December. Some of our nurserymen advertise many other varieties of seedlings, the merits of which I cannot speak from personal knowledge. Amongst the number, some are beyond question entitled to extensive dissemination.

I have never seen an instance of a diseased peach tree in Georgia, within the fifteen years I have been a resident. The disease called the "yellows" at the North is also unknown here. I have never even seen a tree imported from a Northern nursery die with it. The trees suffer for a time after being introduced, but finally recover; but are rather "shy" in the production of fruit.

The ravages of that insect pest, the curculio, or plum-weevil, (*Rhynchænus nenuphar*,) is a serious impediment to the successful cultivation of this and other smooth-skinned fruits, as the nectarine, the plum, and the apricot.

The early varieties of the peach, more especially, are designed to make their appearance, and very shortly too, in the Northern markets, as long as prices rule at so high a figure as at present. Persons from those cities are annually visiting South Carolina and Georgia for the purpose of purchasing peaches in quantity for shipment home. Many large orchards are being planted along the lines of our railroads leading to the Atlantic, with a view to the supply of this trade. The peach ripens here as early as the 10th of June in the middle portion of the State, being some four weeks in advance of the same varieties at the North. Consequently, our orchardists can monopolize the market for that space of time, and still enjoy the use of this luscious fruit at home until near Christmas.

In no portion of the United States have I seen *Quinces* to compare with those grown in the mountain region of North Carolina, South Carolina, and Georgia. In this county, it is not unusual for them to measure from 5 to 5½ inches in diameter, fair, smooth, and "beautiful to look at," in flavor equal, if not superior, to any I have ever met with. The tree is vigorous, and hardy, but requires to be cut down to the ground every six or eight years, and throw up a new shoot, which tends to the improvement of the quality of the fruit.

In the cultivation of *Plums*, but little has yet been done, towards ordi-

nary success, from the cause referred to above, namely, the almost general presence of the curculio, or plum-weevil, which stings the entire crop, causing it to fall prematurely from the trees, and for the depredations of which no mitigation has been discovered. Occasionally a spot is found exempt from them, but no cause has yet been ascertained for this partial exception; both sandy and clay lands being equally attacked.

The finest *Cherries*, both "Hearts" and "Bigarreaus," thrive and promise to do well when engrafted upon the "Mahaleb" or "Perfumed" cherry stock. When worked upon the "Mazzard" stock, which is most generally used at the North, the trunk invariably splits when from two to four years old, causing the tree soon to decay and die. When engrafted upon the Mahaleb stock the tree is dwarfed and of slower growth. This fruit is annually becoming more and more cultivated, and only needs to be more generally known to be properly appreciated. I am not aware that any experiments have been made to originate new varieties here, although no species with us is more worthy of attention, and would probably more amply repay for all care and expense bestowed in its culture.

Of the *Fig*, I need say but little, as it is a fruit peculiar to the South. There is no good reason why large quantities should not be raised for exportation to the Northern cities in the fresh ripe state, and also for preserving and packing dry. The trees grow with little care and produce two fine crops in a season. Quite a number of varieties are cultivated here, upon the qualities of which various opinions prevail as to their merits and faults.

The only distinctive feature in the cultivation of fruit trees here, in general, from that prevailing in the North, is the necessity of permitting them to branch out near the ground, say from one to two feet from the trunk. This treatment, or training, forms a protection from the sun's rays upon the trunk, which, when exposed by trimming off the lower branches, is frequently blistered by the intense heat. Another benefi derived from this mode of culture, is the ground immediately about the root being better shaded, and consequently more enriched by decaying vegetable matter there collected, as well as preventing the stimulating effect of the solar heat upon the roots; which induces an over production of wood, and consequent decay of the fruit before it arrives at maturity.

FRUITS OF VERMONT.

Statement of C. Goodrich, *as reported to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

APPLES.

The crop of apples last year was about two-thirds an average. This season, the prospect in May was good, but the cold winds about the first of June caused an almost total failure in many places, excepting where protected by forests and hills. Orchards so protected are well

filled with small fruit. Had July and August been favorable, the product would have been about one-fourth an average. The "Spitzenberg" and "Baldwin" produce more than other varieties; the last-named are about one-half the usual size.

Of new varieties attracting attention, but little can be said. The "Northern Spy" has not yet answered our expectations. It is a hardy and good grower, but a very shy bearer. It was first propagated by scions, purchased of a Rochester nurseryman, at the modest price of six dollars per hundred, which had been cut from the nursery trees. Old-bearing trees, grafted in 1846, have yet produced but little fruit, while in the same orchard, and like trees as those grafted at the same time with the "Baldwin," cut from bearing trees in Cambridge, Massachusetts, produced full crops the fourth season, and have continued to do so in alternate years, at the same time making a large growth.

The Gravenstein sustains its high character; fair, very hardy, good grower and bearer, and, in every respect I must mark it *best.*

The Red Shropshirevine, of Cole, is, in this State, an old variety; is the most hardy of any early apple; is admirably adapted to high latitudes and cold localities, though inferior in quality to many others.

The Famous Pomme de Neige, or Snow Apple, was the first variety grown in the valley of Lake Champlain, being planted by the French some forty years or more before any English settlement. This is a fine sort for heavy rich soils and high latitudes. It grows better in our hill towns than in warm gravelly soils near the lake, though in damp, heavy, and deep soils it flourishes well here—requires high culture. This apple was planted by all the early French settlers, either in Canada or the States, and, I have no doubt, was brought from France. There is not the slightest reason shown for calling it a Canadian seedling.

We have hundreds of varieties, and from all parts of our country and Canada, in course of trial, but must wait for a more favorable season before reporting on them. Some seedlings on trial, in different localities, I think may prove *best;* and to be fashionable, occasionally, a nurseryman's humbug is started, for which I shall decline standing as endorser.

PEARS.

Of pears, little can be said in addition to former reports; the season has been such that no fair comparison can be made of the merits of such as have been lately introduced. Were I to be confined to one variety it should be the "Flemish Beauty;" very hardy, a great grower, bears early and abundantly, and, for a large pear, best. Blight is little known, but have seen more of it this season than any one prior to it.

PLUMS.

Of plums, in gardens protected by buildings, and in all places sheltered from winds, there is an abundant product. In exposed situations, the more hardy sorts, of which the "Lombard" may be taken as a type, bear abundantly, while of the "Washington," and like tender

sorts, there is almost a failure. Very little trouble with the curculio. Trees where the fruit heretofore has been entirely destroyed have this year produced abundantly with no attention. What has become of them? Were they destroyed by the extreme hard freezing of the ground last winter, or have they departed from other causes?

CURRANTS.

Of currants, few are known except the old red and white. I have, at different times, procured from nurserymen "May's Victoria," "Knight's Large Red," "White and Red Dutch," &c., which have all proved to be the old red and white, or I am too stupid to discover the difference. The Cherry currant has been an exception, and answers the description "in the books." A white currant without a name was presented to Rev. Dr. Wheeler, of this town, a few years since, by a gentleman of Boston, which is quite an acquisition; slow growth, short branches, medium size, transparent, very sweet, and a great bearer—a very distinct and marked variety. A small black currant, very musky, bushes resembling mountain gooseberries, is found on our mountains; and on our lake shores is found another whose growth resembles the "Missouri," which produces a large black variety, very distinct from any other, late, quite sweet, but of no great value.

GOOSEBERRIES.

Many of the English varieties are always fair, producing abundantly, while others, with the same culture, and even mixed in the same rows, are some seasons worthless from mildew. I have no notes of them to give a detailed statement, but am satisfied that by careful observation a selection of the best English sorts may be made nearly as free from it as "Houghton's Seedling."

GRAPES.

The early native sorts suffered from mildew early in the season; about half the usual quantity. The "Isabella," "Miller's," "Burgundy," "Sweet-water," and all late varieties, have not mildewed, but have suffered for want of rain. Since August, we have had a share of cloudy weather and frequent rains—in all, about two inches—which has greatly improved them; also late apples and pears, which have enlarged rapidly. We have no new sorts to recommend as substitutes for well-tried ones. Some, with great recommendations, have proved decided failures while others promise well.

Some wine, from grapes, is made in families; and the time is not distant when it will not be uncommon even in Vermont.

RASPBERRIES.

Of raspberries the "Franconia" is the best for general culture; fully proved, very hardy, always producing abundantly, with no attention to covering in winter.

APPLES.

BY HENRY LITTLE, OF BANGOR, PENOBSCOT COUNTY, MAINE.

Apples grown in this State are kept a month longer than those raised in most of the other sections of the country. I really believe that Maine will, at no distant day, become one of the largest exporting fruit States in the Union. Immense quantities of ice are annually exported to foreign countries in ships owned here, which affords us every facility of adding to the cargo our long-keeping apples. In this respect we have many advantages over our brethren of other States.

Pruning.—The murderous treatment of trees by the free use of the axe, the handsaw, and the large knife, has, in many cases, nearly ruined, or at least greatly injured, many orchards of fine fruit trees in this State. If a large and thrifty limb is severed from a tree, a corresponding root below is thereby paralyzed. The wound is left bare, and consequently does not heal over till the centre of the stump is rotten, and like a cancer or a decaying tooth, it eats more and more into the vitals of the tree and eventually kills it, although it may be many years before the work of destruction is fully completed. Pinching with the thumb and finger is generally all that is necessary in training young trees in checking the surplus branches. So far as my experience goes, I think that no large branch of a tree should be severed, even for grafting; for the scion should be set where the stock is not larger than a common walking cane, or even down to the size of a riding stick. The tree needs all its leaves as they are its lungs, and necessary to its life and thriftiness. Therefore, not more than one-third of the top of a large tree should be grafted in one year. It can be finished the second and third. A very small tree may be grafted near the ground or higher up, as the foliage of the scion may sustain it. But if the scion does not unite, how frequently do we see the stock die unless there are thrown out branches from it immediately.

Fruit trees should be permitted to branch out near the ground, in order that their trunks may be shaded by the foliage of the branches to protect them from the "sun-scald." I remonstrate against the practice of the inexperienced, who injure their fruit and ornamental trees by severe and injudicious pruning, by shaping them in the form of a common broom with the handle stuck into the ground; also, against the use of the axe and the coarse handsaw in pruning; but, instead of them, I would recommend the thumb and finger by the pinching process, or a small pocket-knife, while the trees are young. If a tree of any size is severely wounded by accident or design, the wound should be carefully covered by gum shellac, dissolved in alcohol, or by some other suitable covering.

CONDENSED CORRESPONDENCE.

Statement of Joel Crawford, *of Blakeley, Early county, Georgia.*

Apples, in this region, when the trees are well situated and attended

to, fully remunerate the cost of production; but they do best in the mountainous parts of the State. New, or recently-cleared lands are the most favorable to the growth of this fruit; and in such localities it is less liable to be attacked by worms in and about the roots.

Statement of FRANCIS FULLER, *of Winthrop, Kennebec county, Maine.*

Orchards of choice apples are rapidly multiplying among us, and a large amount of fruit is annually produced.

The price of apples at the orchards on the Kennebec varies from $1 to $2 per barrel.

Statement of HENRY H. HOLT, *of Cascade, Kent county, Michigan.*

The cultivation of fruit begins to attract more attention here than formerly. For sometime, after this part of the country was settled, a mistaken idea prevailed with many that it would be so subject to spring frosts as to prevent the profitable cultivation of fruits. Experience has happily shown that such is not the fact, and that the Grand river valley is well adapted to the growth of those cultivated at the North, especially apples. The specimens exhibited at our recent county fair could scarcely have been excelled by any in the country.

The price is usually very high. Good apples sell for $1 50 per bushel; small, inferior ones, for $1. Very few of the insects so injurious to the orchards of the Eastern States are found here. The following varieties have been cultivated here, and succeed well:

Summer Apples.—Sweet Bough, Spice Sweet, Early Harvest.

Autumn Apples.—Fall Pippin, Twenty Ounce, Maiden's Blush.

Winter Apples.—Vandervere, Yellow Belle-fleur, Swaar, Rhode Island Greening, Roxbury Russet, Rambo, Esopus Spitzenberg, Jonathan, Tallman Sweeting.

Other varieties are in cultivation, but have not been in bearing sufficiently long to be well tested.

Statement of A. G. COMINGS, *of Mason, Hillsborough county, New Hampshire.*

The best winter apple raised in this vicinity is the "Baldwin." It does better under ordinary treatment than any other variety as yet fully tested; and pays much better for good than for bad culture. The fruit differs very much in flavor and keeping qualities under different circumstances of growth and cultivation.

This variety usually bears only once in two years. I have found by experiment, however, that with peculiar culture, it will bear more frequently. I have a tree growing in a rich loam and under high culture, which was well supplied with fruit for five years in succession. The apples grew extremely large and were of very fine flavor, but would not keep so late as the same kind of fruit ordinarily does by months. This fact has led me to examine the subject of soils for raising winter

apples. To do so, I have visited many fruit-raisers to examine their orchards and the products of them. The evidence obtained, leaves no doubt in my mind but that a clayey loam is the only soil which will admit the highest degree of cultivation for this fruit without endangering its keeping qualities.

I have often observed that, where apples stood near stone-walls, especially when composed of porphyritic granite, such trees were less injured by the borer than those differently situated. This led me to try the experiment of crushing these stones, which are very abundant in this region, for the purpose of covering the ground around apple trees. I thought this might be beneficial in three ways: First, by decomposition of the crushed stones; second, by preventing weeds and grass from springing up; and, third, by preserving a more equable state of temperature and moisture in the soil. Not having any machine which would crush the stones, I have not tested the matter thoroughly; but having removed a quantity of small stones of the above description from a field, two years ago, I placed them around some Baldwin apple trees so as to cover the ground on one side only. The experiment succeeded beyond my most sanguine hopes. Last season, the fruit on each tree thus treated held on better, and was very much fairer and larger, on the side where the stones were placed than on the other No other imaginable cause could have produced this difference, which was very apparent in the woody growth of the trees as well as in the fruit.

Statement of Thomas Hancock, *of Burlington, Burlington county, New Jersey, being that portion of his report which relates to apples, to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

The apples best suited to this region are as follows:

Autumn Pearmain,
Bough,
Cooper's Seedling,
Early Harvest,
Fall Pippin,
Hagloe,
Lady Apple,
Maiden's Blush,
Monmouth Pippin,
Monstrous Pippin,
Morgan,
Red June-eating,
Rhode Island Greening,
Roman Stem,
Sheepnose,
Smith's Cider,
Summer Pearmain,
Summer Rose, or Woolman's Harvest,
Tewksbury Winter Blush,
White Seek-no-further,
Winesap.

Statement of William Reid, *of Elizabethtown, and* J. W. Hayes, *Newark, Essex county, New Jersey, being that portion of their report which relates to apples, to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

Apples have not been quite as fair and fine for the last two or three ears as then were formerly, and this season the crop will be far short

of the usual quantity. The unfavorable weather at the time the trees were in blossom prevented the setting of the fruit. The orchards are, however, looking better than they have been for some years, being more free from aphides and other insects that injure the foliage. The demand for apples, for several years past, has greatly increased, particularly early varieties, such as Early Harvest, Fall Pippin, &c., and frequently bring much higher prices than those that are later and attended with a great deal more expense. In Warren, Hunterdon, and several other counties bordering on the Delaware, the Yellow Belle-fleur, Swaar, Newtown Pippin, and Spitzenberg grow well, particularly on the limestone regions, nearly equal to those grown on the banks of the Hudson.

The following selections are taken from those which have been well tested, and such as would be profitable and suitable for general cultivation, leaving out many new varieties that are considered promising, and which will be added, no doubt, hereafter to those already well known:

SUMMER VARIETIES.

Early Harvest,
Red June-eating,
Summer Rose.

FALL VARIETIES.

Fall Pippin,
Fameuse,
Gravenstein,
Maiden's Blush,
Orange Pippin,
Sweet Bough.

WINTER VARIETIES.

Baldwin,
Hubbardston Nonsuch,
Monmouth Pippin,
Newtown Pippin,
Northern Spy,
Rhode Island Greening,
Roxbury Russet,
Wine Apple,
Yellow Belle-fleur.

There are several other varieties cultivated to a considerable extent in Essex, and the adjoining counties, on account of being productive, although not of the best quality, namely: Newark King, Westfield, Long Green, Red Gillyflower; and for cider, Harrison, Campfield, and Granniwinkle.

Statement of John B. Eaton, *of Buffalo, Erie county, New York, being that portion of his report which relates to apples, to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

Fruit-culture in this vicinity has rapidly advanced within the past ten years. Up to that period, it had attracted comparatively little attention, and (except in the nurseries) the varieties cultivated were few, many of them such as would now be considered worthless. The apple was almost the only fruit I cultivated for market, except a few of the most common cherries and pears. There were several pretty large apple orchards, composed chiefly of "Rhode Island Greenings," "Spitzen-

bergs," the various "Russets," and a few others, which at that time comprised the bulk of the varieties under cultivation.

Our winters are variable, and frequently mild, being, by the alternations of severe and open weather, unfavorable to the safety both of the buds and the trees themselves. The springs are generally cold, backward, and windy; and sometimes a late frost causes great damage to the fruit crop. When the season is, fairly opened, however, vegetation advances with great rapidity, and the long continuance of fine weather in the autumn permits the wood to become well ripened, and prepared to sustain the return of cold.

Apples are, of course, the fruit in most general use. There are no remarkably extensive orchards in the immediate vicinity, but numerous small ones, numbering from a dozen to a hundred trees. The older plantations, as has been stated, are chiefly composed of the ordinary sorts, among which there are some seedlings of little or no value. The later ones contain nearly all the best varieties, both old and new, among which the "Baldwin" and "Northern Spy" are in large proportion. Dwarf culture has not been adopted to any extent; but a few trees are scattered through several gardens, more as matters of curiosity than anything else. For table fruits, the following are the most esteemed:

Baldwin,	Northern Spy,
Early Harvest,	Pomme Grise,
Early Strawberry,	Porter,
Esopus Spitzenberg,	Rambo,
Fall Pippin,	Ribston Pippin,
Fameuse,	Swaar.

For Market.

Baldwin,	Rhode Island Greening,
Esopus Spitzenberg,	Roxbury Russet.
Northern Spy,	

The Northern Spy is universally considered the best late keeping apple. We have had them exhibited before the Horticultural Society on the first of June as sound, fresh, juicy, and aromatic as a summer apple. It is much benefitted by severe pruning, as its natural tendency to form a close, upright head is prejudicial to the growth of fine specimens.

The Ribstone Pippin is, in my opinion, a much abused fruit. With us, it is one of the best fall apples, commencing to ripen about the first week in October. It is, on sandy soil, (on clay I have not observed it so particularly,) a rich, juicy, crisp, and high-flavored fruit, just about the proper size for the dessert. It will keep until Christmas, but if kept too long is apt to become dry.

A variety known as the *Ponnal Spitzenberg* is grown in several collections, which I have not seen elsewhere. It is, in general appearance, somewhat like a large specimen of the "Esopus," being however more oblong in form, and having a little coarser grain. Its color is, in the shade, yellow, striped, and overspread with red in the sun, and dotted with large russety specks. In flavor, it is nearly equal to the Esopus, generally bears well, and forms a handsome conical head.

An apple which, although evidently a grafted tree, has never yet been recognized as any known variety, was found growing at the residence of my father when purchased by him, sixteen years since. No information can be obtained of its origin, and it is known by the name "Eaton," which was given to it by the Buffalo Horticultural Society, some years since. It is now quite a large tree, and measures nearly a foot in diameter, with a spreading conical head. In appearance the fruit bears some resemblance to the "Minister," but is generally larger, and is more oblong, not so highly colored, and a higher and better flavored fruit. I annex a description, hoping that it may be identified: Fruit large, generally oblong conical, but varying, at times, to conical; skin dull green, striped with dull red, becoming, when fully ripe, greenish yellow and rich dark red, which predominates on the sunny side. Stalk moderately long, rather slender, inserted in a regular, well-defined cavity; calyx rather large, set in a deep basin; flesh white, tender, and juicy; flavor sub-acid, rich, and very good. In eating from the first week in November to the last of December. Bears well, and will rank as *very good*, at least.

The varieties generally cultivated have been mostly described, and do not require a special notice. I have observed the "Rhode Island Greening" to change its character much when worked on a sweet stock. It becomes more highly colored, being often a beautiful yellow, with a red cheek, and loses much of its acidity; becoming, however, more tasteless when kept late than is usual. The difference is so marked that it has been considered a distinct variety. It is, however, beyond a doubt, occasioned by the influence of the stock, as has been proved by experiment.

The apple is usually pretty free from disease. I have seen it in a few cases affected by a blight, similar to that of the pear. In one instance, a graft, of two years' growth on the top of a young tree, (on sandy soil,) showed all the symptoms of a virulent attack of the disease; but by severe amputation a part was preserved which has since made a fine head and is now in good health.

The caterpillar is the worst enemy of the tree, and in past years nearly defoliated entire orchards. It is, however, easily extirpated, and, by perseverance for two or three seasons in hand-picking, it ceases to be troublesome. The borer has been the cause of some loss in a few collections, but is not commonly productive of much damage.

Statement of LORENZO ROUSE, *of Paris Hill, Oneida county, New York.*

Increased attention is paid by us to the cultivation of fruit both for home consumption and for market. We are more successful in the cultivation of the apple than of any other kind, and fears that the market will be eventually glutted, in consequence of over-production, have thus far proved groundless. On the contrary, the demand continues to increase with the increased supply, and with no immediate prospect of a falling off in prices. As a consequence, most of our farmers have become convinced that a few acres of land cannot be more profitably appropriated than to the cultivation of choice apples; and most of them from year to year are enlarging their apple orchards

by planting young trees of approved varieties, or improving them by renewing the tops of those which produce inferior fruit, but are still of vigorous growth, by grafting.

Of the varieties cultivated, those found most profitable for market are the "Fall Pippin" and "Bunker Hill," for fall; the "Rhode Island Greening," "Baldwin," "Winter Pippin," and "Roxbury Russet," for winter and spring use. The Newtown Pippin, "Esopus Spitzenberg," and "Vandervere," are fine apples when obtained in perfection, but are too frequently disfigured with dark blotches, which render them unfit for market. The "Northern Spy," and some other varieties, which are highly recommended, have not as yet been sufficiently tested.

Our apples are purchased for the New York and Boston markets by dealers, who usually pay $1 per barrel of 2½ bushels, delivered at the canal, either in Clinton or Utica, the purchaser furnishing the barrel. This, it will be perceived, is equal to 40 cents a bushel for the fruit. Choice varieties will command a higher price, according to quality. About 800 barrels of apples were shipped from Clinton in the months of October and November of the present year, and a much greater quantity from Utica. The aggregate quantity shipped is, as I am informed, much less than that of last year, the supply not having been so abundant. It is no uncommon thing for a farmer to put up 200 or 300 barrels of apples annually for market, and the crop is found to be quite remunerative. The fruit is carefully picked by hand about from the 15th to the 20th of October, placed in the barrels on a dry day, and snugly packed by gently pressing down the head of the barrel upon the apples to its place by a small movable lever press adapted to the purpose. This process not only snugly fills the barrel, but prevents the apples from being bruised, or injured, by changing their position in the subsequent handling and transportation.

For late keeping, I have been most successful, after barrelling in the manner above described, by letting them remain in the open air in some cool, shaded location—on the north side of a building, for instance—till late in the season, even till it freezes quite hard, and winter may be considered as having fairly commenced. The barrels are then removed to the cellar, packed away by being laid upon their sides, and remain undisturbed until the apples are wanted for use or for market. By this method, I have no difficulty in maintaining a supply of apples for the entire year. In this manner, russets may be preserved till the middle of July without any material loss from decay; and previous to the coming into market of new apples, will bring from $1 to $2 per bushel. I have apples in my cellar at the present time, (December 4,) which were gathered in October, 1853, and which, although somewhat shrivelled, are otherwise in sound condition. I have even succeeded in keeping them through the second winter; but this, of course, has been merely a matter of experiment, as the apple, after having been kept through one season, becomes tasteless and of no value.

To keep apples in perfection the cellar should be dry and cool, otherwise, the fruit is liable to mould and decay, and serious losses may be experienced.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

The success of this fruit is very much dependent upon favorable seasons. A dry, hot season is generally attended with a failure of the apple crop to a greater or less degree. Very large, old trees cannot be expected to bear in a dry season, because so much sap is required to sustain them. A large proportion of our orchards have been planted from 35 to 50 years. An apple tree is in the most vigorous state for bearing between 15 and 25 years after being set out. For very large old trees, there seems to be no help against the drought. For younger trees, a good spreading of long manure is found to be highly beneficial.

The varieties mostly cultivated here are—

Summer Apples.—Early Harvest, Early Joe, and Bough.

Autumn Apples.—Fall Pippin and Gravenstein.

Winter Apples.—Bellefleur, Northern Spy, Newtown Pippin, Norton's Melon, Rhode Island Greening, English Russet, Roxbury Russet, and Esopus Spitzenberg.

The Early Joe is a beautiful small red apple, ripening the last of August. The Northern Spy originated in this county. The tree grows large and erect, but requires rich culture. The fruit is large, of a striped-crimson color, rich and juicy; keeps till July. Norton's Melon is a large, pale, yellow apple, tender, juicy, and spicy. It originated about six miles from this place. The Rhode Island Greening is a sure bearer in this section, and is one of the best winter apples in our markets.

Besides the above varieties, there are a great many others; in fact, our fruit-growers here have increased their lists of apples to a very unprofitable extent. Orchards should be set with as few varieties of winter fruit as is convenient. If I were to make a new orchard for myself, I should plant it all with Rhode Island Greenings and Roxbury Russets. These varieties seem to suffer less from our hot summers than any others I have seen.

In our part of the country, apple trees should be set in rather moist land, which withstands the drought well. A deep gravelly soil, bordering on a high rise of land, is a very favorable situation. Apples sell here for $1 to $1 50 a barrel.

Statement of C. JACOBS, *of Dayton, Yam Hill county, Oregon.*

Fruit-growing has only made a beginning in our county. A few young orchards of choice grafted apples have begun to bear this year, the products of which brought a very high price; but so limited was the supply that I could state no definite sum. Ordinary seedling apples have sold readily this year for $5 and $6 a bushel.

The apple tree is not known to be affected by the blight here. The peach, in some instances, has suffered from it.

Efforts are making to raise all kinds of fruit, with what success time only will show.

Statement of A. G. Graham, *of Jonesborough, Washington county, Tennessee.*

East Tennessee, without doubt, is one of the finest growing fruit sections of the Union, although, from the isolated position, but very little attention has been paid to the subject, as there is no profitable market.

Of summer apples, we have an endless variety, none of which, however, are worthy of a special notice. The "Rambo" and "Milam" are most excellent for fall use; and the "Pennock," "Readstreak," "Romanite," and others are the best winter varieties.

Statement of Henry M. Price, *of Nicholas Court House, Virginia.*

Apples in this county succeed well, the crop seldom failing. The "Albemarle" and "Newtown" Pippins might be profitably cultivated here. The common varieties are used for cider, which is frequently converted into brandy.

Statement of Gustavus de Neveu, *of Fon du Lac, Fon du Lac county, Wisconsin.*

All the varieties of fruit considered worthy of cultivation in the Eastern States have been introduced here by nursery agents, particularly apples. Although the names of apples are numbered by hundreds, probably those really superior and deserving of general cultivation might be confined to thirty or forty kinds. A seedling fall apple raised on my place was greatly admired at our agricultural fair. It is deep red on one side, light yellow on the other, very fair and smooth, full medium size, tender, with a pleasant acid taste. I call it the "Juliet."

The apple tree has several enemies, and requires unremitting attention to prevent their ravages. Those known to me are the aphis, the caterpillar, the bark-worm, and the "sap-sucking" wood-pecker. The bark-worm is always found under or in the bark of those trees which are not thrifty, almost invariably on the south side of the trunk, particularly of those trees the tops of which do not shade their bodies. I believe the hot rays of our summer sun scorch and wither those parts not shaded, which gives a chance for the introduction of the worm; for I never yet found one of these insects where the bark was fresh and healthy, nor on the north side of the trunk, unless by a continuous extension of their destructive gnawing. I would recommend the formation of the heads of the trees rather low—say 4 to 5 feet from the ground, and encourage the growth of limbs towards the south, in order to afford shade to the trunk; and, also, white-washing the trunk. These precautions combined will, I think, prove effectual. Where worms do exist, they should be dug out by cutting the bark carefully away with a sharp-pointed knife, until they are found and destroyed. Their presence is always indicated by a dark brownish, dusty substance, or by the darker hue of the bark.

The sap-sucking wood-pecker, I thought, at first, was tapping fruit trees for worms; but afterwards discovered that this was certainly not its only object. About the first of October, I noticed that these birds were working very diligently at trees which had very healthy bark, and did not contain a worm. I also remarked that sap was running through the incisions made with their bills; furthermore, I observed by tasting the sap that the little rogues knew perfectly how to discriminate, their most extensive carving and constant presence being at those trees the sap of which was the sweetest. One tree, indeed, I fear is destroyed, the sap of which is very sweet and coagulated on the trunk in a gum resembling molasses, and tasting like sugar. It would appear that the sap of apple trees is much sweeter in autumn than in spring. It is said that white-washing the trees will prevent the attacks of these birds. I would, nevertheless, recommended a free use of powder and fine shot as collateral security.

Statement of J. A. Carpenter, *of Waukesha, Waukesha county, Wisconsin.*

Orchards, planted on prairie and rich bottom lands, grow very rapidly here; but this rapid growth makes some varieties tender, and liable to be injured by our changeable and sometimes severe winters. Some of our hardiest orchards were at first cultivated with a hoed crop till the trees became well rooted. Afterwards, grain and clover followed. A strip of ground, extending two or three feet on each side of the rows, is continued in cultivation with the plow and cultivator, after the remainder of the land is laid down to clover. This prevents the depredations of mice.

PEARS.

CONDENSED CORRESPONDENCE.

Statement of Samuel D. Martin, *near Pine Grove, Clarke county, Kentucky.*

The pear is not quite so hardy as the apple in this region, being subject to the blight in some places. The best remedy I have found is, to cut off the limb affected and burn it, whenever the blight begins to appear.

Statement of Thomas Hancock, *of Burlington, Burlington county, New Jersey, being that portion of his report which relates to pears, to the American Pomological Society, at their annual meeting held at the city of Boston in September*, 1854.

The pears best suited to this region are as follows:

Bartlett,	Beurré Easter,
Beurré d'Anjou,	Bloodgood,
Beurré Bosc,	Doyenné d'Été,

Duchesse d'Angoulême,
Early Catherine,
Echassery,
Elizabeth, (Manning's,)
Flemish Beauty,
Fondante d'Automne,
Henrietta, (Edward's,)
Lawrence,
Limon,
Muscadine,
Osband's Summer,
Oswego,
Rostiezer,
Seckel,
Steven's Genesee,
St. Ghislain,
Trimble,
Urbaniste,
Washington.

Statement of William Reid, *of Elizabethtown, and* J. W. Hayes, *Newark, Essex county, New Jersey, being that portion of their report which relates to pears, to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

The pear, from the great increase of new varieties, introduced within a few years, has made it rather a difficult task to say what varieties are best suited for general cultivation—their habits of growth, hardiness, bearing qualities, &c., which is a very essential thing to be attended to, when planting orchards for market.

EARLY PEARS.

Amiré Johannot.—This variety is only worthy of being cultivated on account of its early maturity—ripe the first week in July. It is, however, much superior to "Petit Muscat," and well flavored when taken from the tree before it gets over ripe.

Madelaine—Is the next variety that ripens, makes a good orchard tree, producing good crops, the best at this season; and ripening in succession are the following: "Early Catharine," "Bloodgood," and "Dearborn's Seedling"; also, "Beurré Giffard," "Doyenné d'Été," "Beurré Gobault," Rostiezer, and Tyson, are varieties that promise well; "Buerré Giffard," I consider one of the best flavored pears of its season; grows well on pear stock with me—moderate on the quince.

FALL PEARS.

Bartlett.—This is decidedly the best pear of its season, ripening here from the middle of August to the 20th of September, and further north keeping until October. It rarely fails in producing a regular crop of good fair-sized fruit; and we have no doubt that an acre of ground planted with it will yield a larger income than any other variety yet fairly tested, ripening at that season. We consider it better adapted for pear stock than quince; on the latter, it required very high cultivation and care in thinning the fruit when young, otherwise it will over-bear, and stop growing. The union with the quince is not so perfect with this variety as many others, in consequence of its early prolific bearing.

Belle Lucrative.—An excellent variety, on either pear or quince.

Andrews.—Another fine variety, and, like the preceding, grows on either pear or quince.

Washington.—Not quite so profitable as some of those enumerated, but when grown on a soil of rather light texture, it has few superiors.

Beurré Bosc.—Very hardy; the fruit fair, ripe in October; a desirable variety.

Seckel.—Succeeds well on all soils, if not too wet; but to have them in perfection, the trees want high cultivation, and the ground kept in the best of order; otherwise the fruit becomes small and unsaleable. Without this precaution, this fine pear is scarcely worth cultivating; but with a high state of cultivation, this variety has no superior.

Duchesse d'Angoulême.—One of the largest sized table pears. Although not yet added to the list by the Pomological Society, it is valuable for market purposes, and, when properly ripened in the house, is very often of fine quality; keeps well after gathering, and generally produces good crops, although it is represented not to bear so well, nor so fine flavored, to the north of this. On heavy soils, this variety is best on quince stock; ripe in October, and will keep until November.

St. Ghislain.—A very superior high-flavored pear; makes a large tree, and bears abundantly.

White Doyenné—also the *Grey.*—Both varieties are liable to crack; they produce, however, fine specimens on quince stocks, but doubtful whether they will do so when the trees get older.

Flemish Beauty.—Is cultivated to some extent, and is generally well spoken of. With us, it has been quite large, but liable to rot very soon at the core, and in consequence not so well adapted for market purposes.

Urbaniste.—A fine hardy orchard pear, producing fruit of a good uniform size, well flavored, and keeps some time after gathering.

Louise Bonne de Jersey.—This well-known and popular variety, we think will succeed here better on the quince than the pear stock. It is a valuable market pear, producing large and very handsome fruit.

Marie Louise.—With us, this variety has always borne good crops, of uniform size; and the present season, when so many kinds failed in setting fruit, it has a fine yield, not always, but frequently, of the best quality.

Beurré d'Anjou.—We think, from what we have seen of this variety, having come partially into bearing, will be equally as good here as it is in the neighborhood of Boston; and if it proves as good a bearer as it is a grower, we hardly think it will be necessary to look for anything better. It is high flavored, of a large size, keeping well, and very suitable for market purposes Those grown with us have been on quince stocks; but it grows well, also, on the pear.

WINTER PEARS.

Vicar of Winkfield.—A fine looking pear, and a great bearer. It is, however, of very ordinary quality, and may be classed among stewing or baking, rather than melting pears—a profitable kind for market.

Beurré Diel.—A large-sized pear, bearing rather sparingly when young. On strong soils, sometimes of the very best quality; but on light sandy ones, frequently worthless; grows well on the quince.

Winter Nelis.—One of the best of early winter pears; ripe here in December. The trees are slender growers when young, but when more ad-

vanced they do better and make good orchard trees; they succeed on either pear or quince.

Beurré d'Aremberg.—Is considered by some one of our finest pears. It has not, however, done quite so well with us; but on lighter soils, we find it does much better. The trees are rather poor growers when young. The fruit is sometimes of the best quality.

Glout Morceau.—We have found to be one of the best winter pears, bearing freely, and ripens without any trouble. It also makes a strong vigorous orchard tree. Those planted on our grounds eight years, produce now about a bushel of fruit.

Easter Beurré.—This is probably the most valuable late pear which is at present in general cultivation, keeping until April, very productive, and makes a fine strong orchard tree on the pear. This variety has not done quite so well with us on the quince.

There are a number of new pears at present under cultivation, which promise well, and we have no doubt that we will be able to select some from the number that will prove valuable, particularly winter varieties, which we stand more in need of than early ones.

Statement of JOHN B. EATON, *of Buffalo, Erie county, New York, being that portion of his report which relates to pears, to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

Pears are largely cultivated, both as standards and dwarfs. Until within a few years, they have been much neglected, and none but the most common sorts were known. The "Orange Bergamot," "Summer Bell," and a few others, and occasionally a "White Doyenné," were the sorts generally to be found. In two years, however, a great change has been made. Now, all the best standard varieties are well known, and every year increases the number by the introduction of the new ones.

In the autumn of 1844, my father commenced the cultivation of dwarfs, at which time there was but one solitary specimen in the vicinity. Now, notwithstanding the predictions of many cultivators that they would be short-lived and unprofitable, there are large plantations of them. Standards have also been largely planted.

The tree has, in general, succeeded admirably, both on clayey and loamy soils, but not at all well on gravelly or very light ones. The blight has made terrible ravages within a few years; and such was the mortality among the trees that some persons were about giving up their cultivation in despair. Its cessation has encouraged them, however, to re-plant. It appeared first as an epidemic in 1850, and destroyed many trees. In 1851, it was still more fatal, and, perhaps, not more than half the trees which were attacked recovered; and even they were so mutilated as to be nearly ruined in many cases. In 1852, it commenced to decrease in violence, and in 1853, it had nearly disappeared, the few cases which occurred being almost invariably the re-appearance of the disease in trees before affected, and but partially cured. The present season, I have seen very little of it, and then in similar cases.

The form of the disease was most usually that which appears at the extremities of the shoots, and, striking with great rapidity downwards, almost invariably, if left to itself, kills the tree outright. A few instances occurred of the stem being first attacked; but these bore but a small proportion to the whole, and were generally readily checked, by cutting out the diseased part while yet small. In the other form, immediate and severe amputation was the only remedy which had much success, and even that was by no means sure, the disease extending downwards so much more rapidly in the inner bark or sap than it appeared on the surface; it required a close examination and considerable determination to cut sufficiently low, persons naturally disliking to mutilate their trees where it seems so entirely unnecessary. The "Colmar d'Aremberg," and "Passe Colmar," seemed particularly liable to its attacks.

Some disappointment and loss has been caused by the use of the common quince for stocks, the trees usually dying without any apparent cause, (while, upon examination, the stock will be found perfectly black and dead,) within two or three years, or else breaking off at the bud.

The cracking and spotting of the "White Doyenné" do not prevail to any great extent, but is sometimes troublesome in individual trees. I do not think that the cause is wholly in the soil, from the fact that of the trees in the same row, but a few feet distant, of the same age, from the same nursery, and upon the same soil, some will produce fine fruit, while others only cracked and imperfect specimens. I have experimented on a large tree, by pruning the roots and tops, digging out the old soil, and supplying its place with a compost rich in manure, lime, ashes and iron, with some advantage, but not to the entire renovation of the fruit.

While speaking of experiments, I will mention one made by a successful cultivator in our vicinity, upon a pear which was blighted to such an extent in the stem that it appeared to be entirely dead. A barrel was placed around it, and filled with tan-bark, which had the effect of quite restoring the tree, and it is now in apparently good health. The inner bark could not have been, of course, destroyed, (as the outer bark was,) or the tree would not have survived. I have seen an experiment of the same kind, made by another gentleman on a yearling tree, which was about to die after being transplanted. He surrounded it with tan-bark, in a similar manner, and it soon sent out shoots into it, which eventually formed a head. Whether this would prove a restorative in all cases, I am unable to say, but in the two instances above quoted, it was certainly quite successful.

The varieties most extensively cultivated are as follows:

Bartlett,
Beurré d'Amanlis,
Beurré d'Aremberg,
Beurré Diel,
Bloodgood,
Duchesse d'Angoulême,
Easter Beurré,
Flemish Beauty,
Glout Morceau,
Grey Doyenné,
Le Curé,
Louise Bonne de Jersey,
Seckel,
Steven's Genesee,
Winter Nelis,
White Doyenné.

Some of the newer sorts are, however, coming into general cultivation, among which are the following:

Beurré d'Anjou,	Laurence,
Beurré Langelier,	Rostiezer,
Duchesse d'Oreléans,	Tyson.

For a small collection for market only, I would recommend—

Bartlett,	Le Curé,
Beurré d'Amanlis,	Louise Bonne de Jersey,
Duchesse d'Angoulême,	Stevens' Genesee,
Easter Beurré,	White Doyenné.
Laurence,	

"Windsor," or "Summer Bell," Pound, Catillac, and Colmar d' Aremberg, I would discard as unworthy further attention, although some of them are large showy fruits. I am not a believer in the practice of cultivating fruits exclusively for cooking, as is frequently done, as I am satisfied that many pears which are good to eat are also good to cook. The former quality being one to which most of the so-called cooking pears have not the slightest claim.

We have been annoyed with some misnomers in pears, as well as other fruits. Among other instances I recollect "Gansel's Bergamot" being received under the name of "Large Seckel," (a synonyme of "Bleecker's Meadow,") and the "Summer Bell" as "Stevens' Genesee." "Souveraine de Printemps" is, I think, synonymous with "Colmar d' Aremberg," and Beurré de Louvain with Catillac.

Statement of Lorenzo Rouse, *of Paris Hill, Oneida county, New York.*

Pears are successfully but not very extensively cultivated among us. The finer varieties are worth from $1 to $3 per bushel in our markets. The "pear-blight," so destructive to our young trees, a few years since, materially checked the cultivation of this profitable fruit; but of late, our trees seem to escape the ravages of this malady, and more attention is being paid to their cultivation. Pear orchards are now being planted on a larger scale. Dwarf trees are preferred by many to standards, as admitting closer planting and yielding quicker returns in fruit, the standard tree being usually too slow a grower to satisfy the demands of those who are impatient of delay and anxious for speedy profits.

Statement of Gershom Wiborn, *of Victor, Ontario county, New York.*

The pear tree is here so great a sufferer from the fire-blight that fruit-growers are greatly discouraged in attempting to cultivate it extensively. There are, however, some localities where the trees bear annually fair crops of pears. Some varieties seem to suffer more than others. The common kinds, or seedlings, seem to suffer least. Such trees as are rapidly growing are more liable to this disease than those growing slowly in sward or in the shade of other trees. I have noticed two or three instances in which pear trees

have been set in groupes of ten or fifteen trees about 12 feet from each another. In each of these clumps, the trees bore exceedingly well, but seemed stunted in their growth.

They stood on clayey soil; and wherever I have noticed healthy and fruitful trees, this has invariably been its character.

The fire-blight here makes its attacks in the latter part of June. The first signs of it appear after a few days of sultry hot weather. To bring on this disease, I believe the heat must rise as high as 96° F., and continue at that range for a day or two. Immediately afterwards, the leaves upon some of the most upright and thrifty limbs turn black, and in a few days the limbs die.

This disease is by no means confined to the pear tree; the quince and apple tree often suffer very much by it. Grafts which have been set in the spring previous and are growing fast, are often killed by it.

Statement of Gustavus de Neveu, *of Fon du Lac, Fon du Lac county, Wisconsin.*

Pear trees do not stand our climate so well as the apple or plum, a few having perished last winter from the intense cold. Those kinds which appear to thrive best, where the collection is not yet very large, are the Bartlett, Beurré Bosc, Beurré Boussoch, Duchesse d'Angoulême, Doyenné d'Été, Glout Morceau, Louise Bonne de Jersey, Oswego Beurré, and Stevens' Genesee—the two latter very hardy and vigorous.

A Madeline pear tree on my ground was killed by the "fire-blight," the leaves turning black in a single day, caused, I thought, by "coup de soleil," immediately after a shower.

PEACHES.

CONDENSED CORRESPONDENCE.

Statement of Joel Crawford, *of Blakely, Early county, Georgia.*

The most highly-flavored peaches grow in abundance in every part of this State. In some sections, however, they are liable to be blighted when in blossom, or in tender fruit, by late spring frosts.

Statement of Samuel D. Martin, *near Pine Grove, Clarke county, Kentucky.*

The peach requires constant attention to keep the tree from being destroyed by the "worms." They should be taken out whenever found in the tree. The best preventive that I have found is, to raise a hill a foot or 18 inches high around each tree, in May or early in June. To prevent the hills from cracking I cover them with leached ashes. These hills will prevent the flies from depositing their eggs. About the first of November, when the hills are removed, I take soft soap and dilute it

with water till it is about as thick as cream, and with a paint-brush, put it around the bodies of the trees about where the tops of the hills had been. A week or two afterwards, the trees should be examined, and if any gum with "sordes," should be seen, the place should be opened and the worm taken out and killed. The eggs are deposited by a blue butterfly, or moth. Clayey soils will crack in dry summers, and unless some means be taken to prevent them, these moths will find their way into the cracks and deposit their eggs in the roots of the trees, where they are much harder to find and destroy than when deposited in the trunks. The soft soap generally kills the worms when it reaches them.

Statement of THOMAS HANCOCK, *of Burlington, Burlington county, New Jersey, being that portion of his report which relates to peaches, to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

The peaches best suited to this region are,

Alberge,
Columbia,
Crawford's Early,
Crawford's Late Melocoton,
Early Melocoton,
Honest John, or George IV,
Imperial,
Large Early York,
Late Free, (Ward's,)
Late Heath,
New York Rareripe,
Nonpareil,
Oldmixon Free and Cling,
Red-cheeked Melocoton,
Red Rareripe,
Scott,
Stump the World,
Tippecanoe Cling,
White Melocoton, (Cole's,)
Yellow Rareripe.

Statement of WILLIAM REID, *of Elizabethtown, and* J. W. HAYES, *Newark, Essex county, New Jersey, being that portion of their report which relates to peaches, to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

A great deal of the soil in the State of New Jersey being well adapted for the peach, a good deal of attention has been given to raising for market; and in planting for that purpose only those varieties have been selected that bear well and produce large fruit, even if not of as good flavor. The following are a few of the varieties in general cultivation for that purpose:

Crawford's Early,
Crawford's Late,
Early Newington or Honest John,
Late Heath Cling,
Morris White,
Oldmixon Free Stone.

The following are well adapted for family use, but not quite as productive as the aforesaid:

Acton Scott,
George IV.,
Grosse Mignonne,
Noblesse,
Red Rareripe,
Royal George,

Statement of J. D. Conklin, *of Locke, Cayuga county, New York.*

The "borer" is the principal enemy we have to contend with in raising this fruit. When young peach trees are transplanted from the nursery to the orchard, they are almost always set from two to four inches too deep in the ground, so as to bury the two lower leaves that first appear after the seed vegetates. This should never be done with any tree, and especially the peach. By the laws of nature, it seems to be provided that those parts of the tree which naturally grow above the ground cannot flourish when buried in it; while the roots cannot be in a healthy state when above the surface of the earth. But the disastrous effects of setting peach trees too deep results principally on account of the borer. The action of the wind upon the newly-set tree soon causes a narrow space to be opened in the yielding earth around the trunk, and thus gives access to the insect to lay its eggs. I have never seen nor learned an instance in which the insect deposited eggs below the first horizontal roots. To what cause this is owing, I do not know. Shallow planting, if not a perfectly sure remedy, is nearly so. The tree should also be firmly held by stakes, to prevent the wind stirring them. The earth should be removed so as to leave the upper roots very near the surface of the ground. Mulching is very important the first season.

Statement of John B. Eaton, *of Buffalo, Erie county, New York, being that portion of his report which relates to peaches, to the American Pomological Society at their annual meeting held at the city of Boston in September*, 1854.

Peaches are a failure with us. Our changeable winters and cold windy springs almost invariably cause the death of the trees after the first few years. In some sheltered situations, they do pretty well, and sometimes produce fine fruit; but their culture is nearly abandoned, and many trees have been rooted out and replaced by cherries and pears.

The borer has been somewhat troublesome when not guarded against by lime or ashes; and the curl in the leaf is an almost certain annual visitor. All these various enemies of the peach have nearly exterminated the fruit in the immediate vicinity of the city. Large orchards have, however, been planted on Grand Island, which are said to be doing finely, and are now just coming into bearing. The greater part of the peaches sold in our market come from Cleveland and Rochester; but some are also sent from Erie, Cincinnati, and other places.

Statement of Lorenzo Rouse, *of Paris Hill, Oneida county, New York*

Our success with peaches is not sufficient to make it an object for us to cultivate them for market. The trees start vigorously at first, but soon give indications of disease, and rarely repay the attention necessary to be bestowed upon them.

The curled leaf prevails to a considerable extent among them, and has a very unfavorable influence on the young fruit, causing it, in frequent

instances, to fall prematurely to the ground; and, in others, checking and retarding its growth to such a degree as to render it comparatively worthless. The cause of this malady does not appear to have been, as yet, discovered, nor its nature fully understood. In most cases that have fallen under my observation, the leaf gradually becomes covered with thick blotches, usually in the month of June, and the margin curls in an unsightly manner. This continues to increase till the leaf becomes a rough distorted mass of disease. It then shrivels and dies, and soon drops to the ground as if the tree were either dead or dying. A new set of leaves, however, soon make their appearance, which usually continues healthy through the season. All the growth of wood is made after this new supply of leaves put forth, and, consequently, is in the latter part of the season. In most instances, the diseased leaf has a mildewed appearance, but this is not invariably the case. In other instances, the mildew and curl appear without the blotches; and still in others, we find the curl without either the mildew or the blotch. No cure for the disease has yet been discovered. The best mode of prevention is to cultivate as vigorous a growth as possible in the tree. Future investigations may reveal the cause and discover an antidote. Until that shall be done, we cannot hope for success in peach-culture.

Statement of Gershom Wiborn, *of Victor, Ontario county, New York.*

This valuable fruit is not altogether certain here. There is sometimes an entire failure of the crop; but this does not happen so often as to deter us in the least from its cultivation. The old kinds are rapidly giving place to new and more valuable varieties, and the old careless system of cultivation to a more enlightened and profitable mode of culture.

I have practised a plan of pruning peach trees different from that of most fruit-growers, and, as I think, successfully. I have cut off nearly all the under or horizontal limbs; leaving scarcely any but the upright branches. My object in this method has been to improve the quality of the fruit, and to make the trees constant rather than great bearers. Peach trees are very much inclined to overload themselves with fruit, and if they are allowed to overdo themselves one year, great injury is done to the fruit-buds which are forming for the coming year. It is for this reason that trees left without attention will occasionally bear heavy crops, and then for a season or two not bear at all. The fruit-grower, therefore, who desires an annual crop of fine, high-flavored peaches, should not prop up the limbs to enable them to sustain a super-abundant crop, but should rather cut away a considerable portion of the under limbs, and thin the fruit out from the remainder. The peach grub (*Ægeria exitiosa*) is injurious when left to itself. But it is easily destroyed by digging the earth away from the trunks of the trees to the depth of three or four inches, and then inserting a penknife or other similar instrument into their holes, which are readily seen in the bark. This can be done either in June or August.

They seem to be the same, or similar to the grub often seen in dead wood, being white and about half an inch in length.

Good peaches often bring $1 a bushel in this section; but inferior fruit will hardly bring one-fourth that price.

Statement of C. S. Betts, *of Texas.*

Peaches are almost the only fruit raised in this section. They do well, and are not inferior to the best grown in the Atlantic States; and from my experience I believe they are not so subject to be injured by the peach-worm as there. The trees last longer because they have fewer enemies. Occasionally, we have a very mild winter, when the trees bloom early, and are therefore liable to be injured by spring frosts. But I have not seen an entire failure of the crops for seventeen years. The "Indian peach" attains a large size in Texas. This tree is not subject to the mildew, blight, nor the ravages of insects. Very little attention is given to improving its quality, and the trees are seldom pruned.

APRICOTS.

CONDENSED CORRESPONDENCE.

Statement of William Reid, *of Elizabethtown, and* J. W. Hayes, *Newark, Essex county, New Jersey, being that portion of their report which relates to apricots, to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

This is a very uncertain fruit here, bearing only occasionally. The following are the hardiest varieties:

Breda,	Moorpark,
Hemskirk,	Turkey.

Statement of John B. Eaton, *of Buffalo, Erie county, New York, being that portion of his report which relates to apricots, to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

Apricots are but little cultivated. They flourish well, but are occasionally overtaken, when in blossom, by a late frost; and the curculio claims any fruit which may set. Sometimes a tree will apparently ripen a good crop, but a great part of the fruit will be found to be inhabited by the worm.

The "Large Early," which has also been cultivated under the names of "Peach," and "Early French," "Breda," and "Moorpark," are the sorts usually planted.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

Apricots can be raised here in perfection; but it is necessary to give them a slight protection from the late spring frosts. This is most conveniently done by training them in the espalier form against the sides of buildings. When the trees are set in low grounds, they are very liable to be damaged by the frost; they should therefore be set in dry grounds. The curculio is very destructive to the fruit, and is, in fact, about the only bar to its successful cultivation among us.

We have several varieties of the apricot, the best of which are the Breda, Early Golden, Moorpark, Peach, and Orange. They all ripen at nearly the same time, the first of August.

NECTARINES.

CONDENSED CORRESPONDENCE.

Statement of WILLIAM REID, *of Elizabethtown, and* J. W. HAYES, *Newark, Essex county, New Jersey, being that portion of their report which relates to nectarines, to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

This fruit, unless cultivated under glass, is liable to be destroyed by the curculio, the same as the plum, and seldom perfects its fruit. The following are considered best:

Elruge,	Violet Hâtif.
Pitmaston Orange,	

QUINCES.

CONDENSED CORRESPONDENCE.

Statement of WILLIAM REID, *of Elizabethtown, and* J. W. HAYES, *Newark, Essex county, New Jersey, being that portion of their report which relates to quinces, to the American Pomological Society at their annual meeting held at the city of Boston in September,* 1854.

"Apple" and "pear-shaped" quinces are both cultivated. The apple-shaped, we think best for general cultivation, and with ordinary care, produces fine crops.

Statement of LORENZO ROUSE, *of Paris Hill, Oneida county, New York.*

Our location seems to be favorable to the cultivation of the quince, and increased attention is being paid to it. As far as yet discovered,

we perceive no reason why this long-neglected fruit may not be produced among us in perfection. The "apple-shaped," or "orange quince," is most generally considered to be preferable for this locality.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

The quince tree is very liable to the "fire-blight," from which it suffers very nearly as much as the pear. Its nature and habits of growth have not as yet been sufficiently studied. From what I have been able to learn, I think it does the best upon a rather poor, damp, but not wet soil. Manure and severe pruning are almost sure to kill it. This treatment stimulates the trees to a rapid and tender growth, which continues till the heat of our summers become insupportable to them, when their leaves all at once turn black and the limbs wither away and die. The ground should not be cultivated around the trees, but a tough sward allowed to form. When left in this condition, the trees acquire a slow growth and seem to become hardy and much less liable to the blight.

There are two varieties cultivated here, the "Apple," or "Orange," a large bright yellow quince, which ripens in October; and the "Portugal," longer in shape, lighter in color, and later than the other. The former is most cultivated. There is another variety, the "French quince," used by nurserymen for stocks to graft pears into, but not cultivated for the fruit. Quinces are worth, in the season, about $1 per bushel.

PLUMS.

CONDENSED CORRESPONDENCE.

Statement of JOSEPH C. ORTH, *of McCleary's Bluff, Wabash county, Illinois.*

The plum, with us, except the wild or native variety, is an almost universal failure. I do not remember to have seen a plum well matured and ripened west of the Alleghanies, during a residence of over ten years. The disease manifests itself by the fruit rotting before it ripens, chiefly caused by the curculio. The trees also soon become knotty and lose much of their sap, which oozes out at those knots.

Statement of FRANCIS FULLER, *of Winthrop, Kennebec county, Maine.*

Plums, in this section, are easily and abundantly raised, notwithstanding the curculio and "black-knot" are serious annoyances in producing perfect fruit. As yet, there is no remedy for the latter, except that of cutting them from the trees and casting them into the fire.

Statement of LORENZO ROUSE, *of Paris Hill, Oneida county, New York.*

Plums would succeed well with us were it not for that little pest, the "curculio," which is so abundant as to destroy most of the fruit. Consequently, as the successful cultivation of this fruit requires constant care, and the consumption of more time than many of our people are willing to bestow upon it, no great attention is given to it at present.

Statement of WILLIAM REID, *of Elizabethtown, and* J. W. HAYES, *of Newark, Essex county, New Jersey, being that portion of their report which relates to plums, to the American Pomological Society, at their annual meeting held at the city of Boston in September,* 1854.

Plums have not been cultivated in this part of the State with any success for a number of years, the curculio seeming, so far, to baffle all the efforts yet made to stop its progress. Excepting a few grown in poultry yards, and in the immediate neighborhood of dwelling houses, we may say that we have no plums worthy of notice. The following are varieties used for preserving:

Blue Damson,
Coe's Golden Drop,
Green Gage,
Imperial Gage,
Jefferson,
Purple Gage,
Red Magnum Bonum,
Washington,
White Magnum Bonum.

Statement of JOHN B. EATON, *of Buffalo, Erie county, New York, being that portion of his report which relates to plums, to the American Pomological Society, at their annual meeting held at the city of Boston in September,* 1854.

Plums, here, have not been largely planted for market. The common "Blue Plum" and the "Magnum Bonums" are most abundant; and the latter is almost the only sort which appears to any extent in market. But some finer varieties, such as the "Washington," "Smith's Orleans," the "Green," "Yellow" and "Imperial Gages," are pretty generally disseminated; and many of the newer varieties are under cultivation to a greater or less extent.

The trees succeed well with us, unless upon our lightest soils, where they are liable to lose their foliage in summer.

The "black wart" has appeared within a few years, and, if not watched, soon overspreads a tree; but it is easily kept in check by amputating when it first appears, and has not, as yet, prevailed to any injurious extent.

The curculio is the worst enemy to plum-culture, and generally destroys the greater part, if not the whole, of the crop. Various remedies have been unsuccessfully tried. Chickens, lime, nets, spading, &c., have usually failed. Shaking the trees is the most effectual remedy, when on a small scale. Occasionally, individual trees bear fine crops, (even in the midst of those on which every fruit is destroyed,) without any apparent cause. And the common blue

sorts, which are profuse bearers, sometimes mature a pretty large crop, perhaps from the great abundance of the fruit, rendering it difficult for the insect to puncture all the specimens, or because it is scarcely worth the trouble, on account of the thick tough skin. Until there is found a more effectual remedy than any which we now possess, it is decidedly unprofitable to plant plums either for the market or table. For the latter use, however, those who are fond of the fruit will not be deterred from planting a few trees of the "Green Gage," "McLaughlin," "Lawrence's Favorite," "Bleecker's Gage," or the "Jefferson."

"Virginale blanche" is a fine variety, which I have never seen noticed. It was obtained several years since from Mr. Mantel, of New York, and was also received under the name of "Peach," from which it is widely distinct. It is a medium-sized greenish fruit, about the size of the "Green Gage," but more oval in form. It is rich, juicy, and finely flavored, very nearly equal to the "Green Gage" in quality, and generally bears a small crop (and sometimes a large one) in spite of the curculio. It certainly promises well, and I think will rank among the best.

Among the mistakes in names which have been detected, are those of "Imperial Gage," received for "Cooper's Large," and "Green Gage," for "Damas violet."

Statement of Gershom Wiborn, *of Victor, Ontario county, New York.*

The plum, in many localities here, may be considered as difficult to raise. On a sandy soil, it generally will not live long enough to bear fruit at all; while on a clayey soil it does rather better. It seems to thrive there pretty well while young; but by the time it arrives at a bearing age it begins to show signs of the "black knot." The first symptoms of this disease appear in the form of warty excrescences on the small limbs. In time, they spread from limb to limb until the whole top of the tree is covered with "black knots" and dead bark.

The usual treatment of this disease is to cut off the affected limb as soon as any of the black knots appear upon it. As might be expected, this entirely fails of success. In my opinion, these black knots are the effect, and not the cause, of the real disease. The cause may more probably be looked for in the unsuitable nature of the soil in which the plum tree is often set.

The finest and healthiest trees here grow upon a deep, rich, clayey soil, near the bank of a stream or on the shore of a lake. Some fruit-raisers compare this disease with cancerous affections in the animal system, and speak of its spreading from one tree to another. But if the soil is unsuitable, many trees will begin to be affected by the disease at nearly the same time, a fact not very consistent with such a theory. The curculio is the only very serious hindrance to the successful cultivation of the plum. This insect, in the present state of our knowledge of its nature and habits, is a hard little enemy to contend with.

Within the last ten years, I have read of many "sure preventives against the curculio." I have tried several of them with partial success; but the surest I have ever seen tried is, to smoke the trees with a torch strongly scented with tar and brimstone; the operation being repeated once a week, from the time the fruit begins to grow till the 1st of July. Last season, I found, by observation, that the nsect does not, in all cases, get upon the trees by climbing their trunks, but can use its wings for the purpose, if necessary. Hence the employment of hens and other fowls to run under the trees cannot be an effectual remedy.

Plum trees will not bear much pruning. They should, therefore, be budded, or grafted, while yet small.

CHERRIES.

CONDENSED CORRESPONDENCE.

Statement of WILLIAM REID, *of Elizabethtown, and* J. W. HAYES, *of Newark, Essex county, New Jersey, being that portion of their report which relates to cherries, to the American Pomological Society, at their annual meeting held at the city of Boston in September,* 1854.

The cherry crop, this year, has been almost an entire failure here from the effects of the cold, frosty and changeable weather when the trees were in blossom; a thing that rarely happens, except when the weather is wet at the time of ripening.

Statement of JOHN B. EATON, *of Buffalo, Erie county, New York, being that portion of his report which relates to cherries, to the American Pomological Society, at their annual meeting held at the city of Boston in September,* 1854.

Next to apples, cherries are our most common fruit. The "Late Kentish," or common red cherry, is in nearly every garden in greater or less numbers, and many of the finer varieties are widely disseminated. This locality seems well adapted to their cultivation, and they grow luxuriantly and produce abundantly with but little care. Some cases of bursting have occurred; and in one orchard, where the trees had made a very large growth, on a gravelly soil, (which seems well adapted to this tree,) many of the trees were badly injured and several killed. As a preventive, the orchard was laid down to grass, which operated as a slight check to the growth, (although not injuriously so, as the trees had become well established,) and since then but few cases have occurred. Elsewhere, the disease has not caused any extensive injury.

Another disease (if it may be so called) is occasionally seen, which I have never seen described; a shoot, generally from a branch

of moderate size, will make an enormous growth, exceeding, by many times, the size of the branch from which it springs, and throwing up in a closely compacted, fastigiate form, an abundance of stout shoots, the foliage of which is of an unhealthy reddish color, and somewhat curled. After growing in this manner for one, two, or more years, the branch suddenly dies, not unfrequently causing the death of the parent limb. This disorder usually appears on the outer branches, but sometimes in the interior of the head; and I have seen nearly the entire top of a small tree affected by it. I have tried amputation as a remedy, but always without success, the disease sometimes breaking out again. It is not, however, very common.

Aside from the slug and the brown caterpillar, the cherry is annoyed by but few insects; but of late, the curculio has, in some localities, committed ravages upon the fruit, a great part of the crop on some trees being wormy. I have observed that the "Elton" is a favorite with this insect, and that a far greater number of this variety were punctured than of most others.

More confusion has existed in the nomenclature of cherries than of any other fruit, both among trees grown in the vicinity and those received from the eastward. Some of these I will notice:

"May Duke" has been received for "Early Richmond," "Bleeding Heart" and "White Heart;" and "Holman's Duke" is apparently not distinct. "Griotte de Chaux" were partly "Downer's Late," and the remainder a worthless "Duke." "Montmorency" was "Flemish," and "Double-flowering Saxony" was "American," "Amber," and "Downer's Late." "New Honey" was "Black Heart," and some "Reine Hortense" are probably the same. "Belle de Choisy" proved to be a very late "Duke," (a fine fruit, by the way,) and "Fellows' Seedling" is the "Bigarreau." The variety cultivated by some under the names of "Waterloo," "White Waterloo," and "Carnation," is probably the "Downton."

The varieties most generally cultivated are as follows:

Black Heart,
Black Tartarian,
Downer's Late,
Elton,
Knight's Early Black,
Late Kentish,
May Duke,
Napoleon Bigarreau,
Tradescant's Black Heart or Elkhorn,
White Bigarreau.

I would plant, for market, largely of the—

Bigarreau,
Bigarreau de Lyon,
Black Tartarian,
Downer's Late,
Elton,
Florence.

For the table, I should select the following:

Bigarreau de Lyon,
Black Eagle,
Black Tartarian,
Downton,
Downer's Late,
Early Purple Guigne,
May Bigarreau,
May Duke,
Late Duke.

I should not cultivate "Late Kentish," "White Tartarian," "Remington's White Heart," "Tradescant's Black Heart," nor "English Gaskin," considering them nearly or quite worthless, while we have so many better sorts.

The variety referred to above as Bigarreau de Lyon was among a lot of imported French trees, planted by my father, Lewis Eaton, in the fall of 1841 and spring of 1842. Whether the name by which it is known is the correct one I am unable to say, as the trees lost their labels, and this name was selected from the invoice as probably belonging to it.

It is a remarkably fine fruit, quite as large as the "Black Tartarian," and equal to it in flavor, while it ripens with or before "Knight's Early Black," to which it is superior in size and beauty, and fully equal in flavor. The fruit is large, obtuse, heart-shaped; skin thick. Before fully ripe, dark bright red, beautifully mottled and striped with light red, and becoming nearly black at maturity. Stalk from one and three-fourths to two inches in length, pretty deeply inserted in an irregular hollow; texture indistinct; stone large and elongated; flesh dull red, firm and juicy; flavor sweet and rich—very good. Ripe from the 20th to the 25th of June, and lasts for some time.

Tree a remarkably luxuriant grower, resembling, in its spreading, straggling habit, the "Elton," but far more vigorous. Leaves very large, dark green, somewhat wavy; foot-stalks rather long and very stout, dark red; glands reniform. The trees, while young, have not borne remarkably well; but as they advance in age and increase in size, they show indications of being good bearers.

Statement of LORENZO ROUSE, *of Paris Hill, Oneida county, New York.*

Cherries formerly succeeded well with us, and the common "Morello," which was universally cultivated, yielded abundantly. This kind, however, having been most infested with the "black knot," has now nearly disappeared. Other and more choice varieties are now gradually being substituted; but as these are generally less prolific as bearers, what we have gained in quality has been sacrificed in quantity.

The black knot may be generally prevented, or checked, by careful cutting and close attention, the infected portion being entirely removed as soon as discovered. If neglected, the tree will become irretrievably ruined. The same disease is also a terrible scourge to our plum trees, and, with them, requires the same treatment.

Among the varieties of the cherry now most popular with us, may be named the "Black Tartarian," "Black Eagle," "Bigarreau," "Belle de Choisy," "Elton," and "May Duke." The fruit will command from $2 to $4 per bushel.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

This excellent fruit is raised here in great perfection. The trees are thrifty, good bearers, and are subject to no particular malady. The

old varieties, which have long been cultivated, are the "Black Mazzard," the common "Red" or "Pie" cherry, and the "Honey Heart." The following varieties have recently been introduced: May Bigarreau, China Heart, Elton, Yellow Spanish, Burr's Seedling, Napoleon Bigarreau, Carnation, Belle Magnifique. The May Bigarreau is the earliest of all cherries worth cultivating. It ripens the last week in May. It is of medium size, tender, and of good flavor, and being so early, is little liable to be injured by the curculio. The next best cherry is the China Heart. It ripens about the middle of June; is an excellent variety, tender and juicy; of medium size, and a great bearer. The Morellos are an excellent class of cherries, ripening about the 1st of July with us. The next in order of ripening is the old sour Red cherry, the best of all for culinary purposes. About the same time, the Honey Heart ripens. This variety is the best for eating; and if it were only about twice as large as it is, it would be preferred to all others.

Statement of ANDREW J. REID, *of Greenwich, Washington county, New York.*

Our soil and climate are both favorable to the cherry. The red and black Morellos have been generally cultivated heretofore, but other varieties have been but lately introduced. Some twenty years ago, all the black cherries, which had previously flourished well, were destroyed in a single winter. It is particularly worthy of notice that those black cherries which had been engrafted upon a red stock entirely escaped the calamity, and are to this day good bearers.

CURRANTS.

CONDENSED CORRESPONDENCE.

Statement of JOHN B. EATON, *of Buffalo, Erie county, New York; being that portion of his report which relates to currants, to the American Pomological Society, at their annual meeting held at the city of Boston in September*, 1854.

Currants are grown here more for family use than for sale, yet the market is generally pretty well supplied with them. The old "Red" and "White" still hold their place, notwithstanding the superiority of the "Red" and "White Dutch," which I consider much the finest sorts for the table, even in comparison with the larger varieties, "Victoria," "Cherry," "Grape," &c.

GRAPES AND WINE.

REMARKS ON THE GRAPE DISEASE OF EUROPE.

BY J. F. ALLEN, OF SALEM, ESSEX COUNTY, MASSACHUSETTS.

A few years since, the "mildew," a parasitic fungus, made its appearance upon the grape-vines of Madeira, and has since been extending itself over the vineyards of Europe, upon which I propose to make the following remarks, having given much attention to grape-culture, and investigated, as well as I was able to do, the diseases to which the vine was subject in the United States. I felt sure, after reading the first printed descriptions of the evil, that it would prove to be the mildew of America, attacking, as it does, the Eastern and European varieties of the grape at mid-summer, destroying the entire crop of fruit, so frequently as to discourage its cultivation. The occurrence of very dry, clear weather, in July, will prevent the vegetation of the sporules, or seeds, of the fungus; and thus the Chasselas and the Black and White Cluster grapes will ripen fully in most of the New England States. This will happen not oftener than once in ten years; and it is then said we have had a fine, warm season, when the average temperature has not been greater than usual, and the actual cause, the dryness of the air in July and August, is overlooked.

The climate of a large section of the Northern States is well adapted to the cultivation of the grape. There are many varieties of the vine that will withstand winters of equal severity; such, for instance, as are cultivated in Germany, on the Rhine, &c. Why, then, have all attempts to grow these varieties in vineyards in this country proved failures? Because of the attacks of this fungus, as stated above. It usually appears in Massachusetts in foggy weather, in July and August, and not earlier. When first seen, it resembles white mould; and if examined when in this fresh condition through a powerful microscope, it is very beautiful. In the Agricultural Report of the Patent Office for the year 1853, page 311, there may be found an engraved illustration of this mildew fungus. It appears in a communication to the State Department from Nicholas Pike, consul of the United States at Oporto. This is a correct representation of the American mildew, and leaves no room for doubt as to the identity of the two species. The marks of the mildew can be found on the imported grapes and raisins brought here from Malaga. This is similar to those made by our mildew on the same varieties of the grape. On page 312, of the same Report, is an illustrated specimen showing its effects upon the fruit. When a grape becomes affected by it, the fruit will either dry up or crack open, as in this specimen, unless checked or destroyed before it makes much progress.

This so-called disease is a living plant, most rapid in its growth, and wonderful in its powers of reproduction and multiplication. It would appear to be a most serious evil to the people of the countries dependent upon the cultivation of the grape for their subsistence. When a vine has once been infected by it, the seeds, or sporules, in

countless millions, lie waiting a favorable atmospheric change to spring into life; and when this does occur, so rapid is their growth, that in the short space of one day, the under side of the leaf will be almost covered. If the vines are constantly watched, particularly on the under side, and, when the first appearance of the fungus is noted, the flour of sulphur is dusted upon the leaves; this will kill the fungus wherever it comes in contact with it, changing it from white to black, and then it is dead. The difficulty here is in applying the sulphur to the under side of the leaf. It is hard to make it remain in this dry state; and it requires so much labor to go through a vineyard in this manner, as to make the cost perhaps an unwarrantable outlay; unless it should prove to be the case, which I think may be so, that after two or three years' application of the sulphur, the seeds of the fungus would be exterminated. I have found a wash quite effectual in destroying this fungus. It can be applied more easily and surely, and with less cost of labor and material. It can be applied on a large scale with the garden engine; on a smaller, by the syringe or the rose of a watering pot.

To prepare this wash, take one peck of lime, not slaked, and one pound of sulphur; put them together in a barrel, and pour hot water over them sufficient to slake the lime; see that the sulphur is well mixed with the lime; pour on this three gallons of soft water, and stir the mixture well together. In twenty-four hours, it will have settled and become perfectly clear. This should be drawn off as clear as possible. Half a pint of this mixture, added to three gallons of water, will be sufficiently strong, and may be applied over the fruit and every part of the vine when the mildew first appears. It can be repeated every few days, if occasion requires. The first application, I have found, would kill the most of it; a second and a third is all that I have ever found necessary for the season. The fruit and foliage have ripened fully on the European varieties. The American or native varieties are less subject to the attacks of this fungus than the European. There is also a difference in these, the "Catawba" and "Isabella" being more attacked than some other kinds.

That this mildew, or fungus, requires a peculiar condition of the atmosphere to allow of its vegetating, is a hopeful fact for the people of the European grape-growing regions. A series of seasons unpropitious to its growth may destroy the millions of sporules, or seed vessels, deposited upon their vineyards. Should not this occur, they are not without hope, as sulphur, and a preparation of sulphur, will destroy it. Perseverance, with its application, will keep it in subjugation until the favoring season arrives for its final extermination.

CONDENSED CORRESPONDENCE.

Statement of JOEL CRAWFORD, *of Blakely, Early county, Georgia.*

Many house-keepers in this region cultivate the vine, and grapes may be had in great abundance with but very little labor. The "Scup-

pernong," a native of North Carolina, the "Devereux" and "Warren," natives of this State, the "Isabella" and "Catawba," said also to be natives of North Carolina, all bear most excellent fruit. Some good wine has been made here, but the grape is chiefly cultivated in gardens for table use.

According to my observations, no American grape is liable to be seriously injured in Southwestern Georgia by irregularity of seasons, nor by the ravages of insects. Though we had severe frosts in April last, which were followed by an uncommonly hot and dry summer, my Scuppernong, Isabella, and Catawba vines matured their fruit.

Statement of MARTIN MONDY, *of Vermilion county, Illinois.*

The grape has, as yet, received but little attention with us. I have cultivated it for several years with varied success. I have twelve varieties growing, all of which, except the Bland, Cape, Madeira, Black Muscadine, and a small black native grape, are subject to rot. The last named is a great bearer, with compact bunches; ripens about the 1st of September; and makes good wine, of a deep purple color. The Cape, Isabella, and Catawba ripen very well. I have made some wine, which, at one year old, is pronounced an excellent article. It sells for $4 per gallon.

Statement of JOHN LAW, *of Evansville, Vanderburgh county, Indiana.*

Our farming population is mostly German. They are paying great attention to the vine, and if the season is a good one, they will probably make from three to four hundred barrels of Catawba wine in this county the coming season. They are greatly extending their vineyards, and the grape does very well. The wine, I think, is equal if not superior to any I have drunk at any place, Cincinnati or elsewhere.

Statement of FRANCIS FULLER, *of Winthrop, Kennebec county, Maine.*

The Isabella grape is the only variety which has hitherto been cultivated in this region with success in the open air; although the "Diana," "Clinton," and "Concord" varieties are now being tried.

Statement of FREDERICK MUNCH, *of Marthasville, Warren county, Missouri.*

The wine crop in Missouri was nearly an entire failure the past season, in consequence of heavy mildews which seized them when in blossom, or soon after. The Catawba nowhere yielded more than half a crop, and in most instances not a tenth of the ordinary yield. Although, according to my experience, I cannot attribute the "rot" to a "weakness in the vine," as Mr. Anthony Miller suggests (page 301 of the Agricultural Report for 1853.) I will concede that a vine in full vigor is more able to withstand the effects of mildew than a feeble one; and, therefore, close trimming may as well be recommended as high

manuring. However, I should like to know the result of Mr. Miller's preventive, when it has been tried. But, in my opinion, the only sure remedy to be found is in the selection of such hardy varieties of grapes as are less liable to the injurious effects from our Western climate than the Isabella and Catawba.

There is a difference in this respect, even between different varieties of our native Western grape-vines. I had transplanted from the woods into my vineyard a vine, which I had observed to bear fruit for many years without failure. It, however, blossoms early, and on that account the mildew seized it last spring, and cut off the whole crop, while other varieties entirely escaped. Among the latter are the Halifax grape, which yields a wine of some acidity, but gradually becoming milder, till, in the course of a year or two, it is quite palatable; the Rock House Indian, a native of Illinois, clusters and berries small; the Little Ozark, similar, but in every respect superior, in my judgment, to the last mentioned variety; and the Wine House grape, found growing spontaneously in a corner of my own vineyard, larger than the two last named, of a sweet and aromatic flavor, but, like all our Western native sweet grapes, not very juicy. Two or three other varieties, which I brought from the Ozark mountains, did not bear this, but probably will next year. As yet, I am not able to decide whether the above-named varieties are good bearers; but I can state with certainty, that since I have had them under my treatment, they have never in the least been affected by rot or mildew. Whether they all will be suitable for wine-making is yet to be ascertained.

Statement of A. G. Comings, *of Mason, Hillsborough county, New Hampshire.*

The Isabella grape is perhaps the best variety cultivated in this vicinity; but it is very apt to mildew, and loses its fruit when growing on wooden frames or buildings. In this rocky region, the mildew can easily be prevented by training the vines upon beds or heaps of stones. By this means, the fruit will ripen from two to three weeks earlier than ordinarily, which, in this latitude, is of great consequence.

Statement of Samuel Webber, *of Charlestown, Sullivan county, New Hampshire.*

The cultivation of the grape is rapidly extending in this vicinity, principally for table use. Some experiments are also beginning to be made in making wine. Last spring, I tasted a sample of wine made in this town from a native northern grape. It was very palatable, resembling some of the German wines, but, to my taste, superior to much of the wine imported from that country. This grape, together with several similar varieties, came up spontaneously in my garden in great numbers. The best ones came up under vines of the native Black Fox-grape; but the fruit is smaller, the bunches longer and looser, and generally have more of the musky flavor of the parent grape. They differ

slightly from one another in flavor, time of ripening, &c., somewhat as apples raised from seedlings do, but not with so wide a range of difference. The common Isabella and Catawba grapes will not endure our winters, and their fruit seldom ripens on account of the frost. I have a variety, however, raised from a seedling, which came up under an Isabella vine, and will partially withstand the winter without protection, and the fruit of this kind ripens considerably earlier than that of the parent vine. The fruit of it is excellent. It is possible that by propagating vines through two or three generations in this way, the Isabella and other fine varieties may become acclimatized.

Statement of WILLIAM REID, *of Elizabethtown, and* J. W. HAYES, *of Newark, Essex county, New Jersey, being that portion of their report which relates to grapes, to the American Pomological Society, at their annual meeting held at the city of Boston in September*, 1854.

"Isabella" and "Catawba" are the two best varieties for general cultivation; and from the numerous facilities of sending them to market, they generally remunerate well those engaged in their culture.

Statement of DANIEL J. HAWKINS *and* PHILEMON STEWART, *of the United Society of Shakers, at New Lebanon, Columbia county, New York.*

We have a variety of native grape which originated in our village, and is, we believe, superior to any other, native or foreign, known in this country, for the Northern and Middle States; and we have every reason to think that it would be greatly improved by removal to the South. Our opinion of its merits has been derived from an experience of many years in cultivating more than thirty varieties of grapes, including the far-famed Isabella and Catawba. We call it the "Early Northern Muscadine." It ripens at least one month earlier than the Isabella or Catawba, and is quite hardy, withstanding the winters of New York and New England without protection. It has been tried with good success in New Hampshire and Maine. It is a profuse bearer if the vines are kept well trimmed. The fruit is of an amber color, nearly transparent, has a very thin skin, and little fibre in the pulp. It contains nothing of the foxy flavor so common to the northern native grapes. It has been pronounced, by good American and French wine-makers, as equal if not superior to the Isabella and Catawba grapes for making wine.

We have also another very early native seedling of the fox flavor and variety. It is large and good, and ripens at least two or three weeks earlier than any other grape in this county. It is called the "Early August," or "Burton's Early August." As it ripens by the 25th of August in New England, it would be a valuable acquisition to our Northern gardens.

Statement of JOHN B. EATON, *of Buffalo, Erie county, New York, being that portion of his report which relates to grapes, to the American Pomological Society, at their annual meeting at held the city of Boston in September*, 1854.

Grapes are cultivated in the open air, and with but indifferent success. The "Isabella" is grown in almost every garden, but it rarely perfectly ripens its fruit, unless much sheltered. The other hardy varieties are but seldom grown. The "Diana" is under trial, and may prove valuable.

Culture under glass, without fire heat, is extending rapidly. Many houses have been erected within three years, both span-roofed and cants, the vines in many of which are promising fine crops.

Statement of JAMES H. WATTS, *of Rochester, Genesee county, New York.*

The season for grapes, in this section, was never finer than the last. The "Isabella," "Clinton," and "Catawba" perfected themselves well. Some Catawbas ripened so thoroughly that they were nearly as sweet as the Malaga raisin grapes.

Wines are made from the Isabella and Clinton grapes for domestic use, but not for sale.

Statement of LORENZO ROUSE, *of Paris Hill, Oneida county, New York.*

The grape, with us, is cultivated by many, but solely for table use. The "Isabella" and "Catawba" will seldom ripen in open culture. Trained on a building or wall they sometimes succeed well, but are hardly adapted to our climate. A few varieties of the foreign sorts will generally ripen without extra care; but our position is too much elevated and exposed to admit of the profitable cultivation of this fruit, either for wine or for market. The culture of the choice varieties must be principally the work of the amateur.

Statement of GERSHOM WIBORN, *of Victor, Ontario county, New York.*

The vine here is subject to no particular disease, and I have no doubt but that wine-making could be carried on successfully among us. But no attempts at making wine have as yet been made within my knowledge. The grape-culture is confined to a few vines in our gardens for table use.

To preserve grapes for winter use, it is only necessary to pack the clusters in boxes alternately with layers of well-dried forest leaves. The Catawba is the best variety for this purpose.

Vines that are set in gardens, where they are expected to remain many years, evidently require more space to extend themselves in than when planted in vineyards, where they are taken up every few years to be replaced by younger vines. For this reason, the system of close pruning, practised in vineyards, will not do for garden culture.

Statement of ANDREW J. REID, *of Greenwich, Washington county, New York.*

The cultivation of the native grape is receiving increased attention here. Those who have attempted their cultivation have been generally successful. We already have vineyards occupying several acres each. Clayey ground is especially favorable to the growth of the grape. The vines require no protection in winter, and produce fine crops.

Statement of C. F. BETTS, *of Texas.*

The grape is not cultivated with us; but we have wild vines, which grow to a size that I have not seen equalled elsewhere. I have made wine from these grapes in the following manner:

The fruit is picked from the stems, put in a vessel, and rain-water added till the grapes are covered. They are then washed with the hand in order not to crush the seeds, and put in a barrel till it is filled. The barrel is then covered and allowed to stand eight days. The juice is then drawn off, and three pound of sugar added to each gallon. The barrel in which the juice is put is afterwards bunged tight, and in a few months the wine becomes similar to long-corked claret. By adding five pounds of sugar to each gallon of juice, the wine resembles sweet Malaga; and by adding four pounds, wine of a different flavor is produced.

Statement of GUSTAVUS DE NEVEU, *of Fond du Lac, Fond du Lac county, Wisconsin.*

The Isabella, Clinton and Catawba grapes have ripened this year to perfection; the Clinton being ripe by the first of September. Our summers are as favorable, perhaps more so than those of France under the same latitude, and, from all appearances, table grapes will succeed here. Messrs. Lallier, from France, settled near Fond du Lac, have brought several kinds of wine grapes, with which they are confidently experimenting, and intend to plant a vineyard.

Statement of J. A. CARPENTER, *of Waukesha, Waukesha county, Wisconsin.*

Grapes are raised here principally for family use, and a few for market. The Clinton is hardy, and ripens earlier than the Isabella, but its flavor is rather foxy. The Isabella requires a very favorable location to perfect its fruit. I have seen fine specimens raised on the south side of a stone house. Vines planted on hills and knolls, which have a dry, gravelly sub-soil, succeed best.

STRAWBERRIES.

CONDENSED CORRESPONDENCE.

Statement of JOHN B. EATON, *of Buffalo, Erie county, New York, being that portion of his report which relates to strawberries, to the American Pomological Society, at their annual meeting held at the city of Boston in September*, 1854.

Strawberries have been pretty largely planted for market. Some growers have been very successful both in producing good crops and large fruit. Mulching with tan-bark has been largely tried, and usually with advantage to the crop. The sorts mostly cultivated are as follows: Boston Pine, Burr's New Pine, Hovey's Seedling, Large Early Scarlet.

RASPBERRIES.

CONDENSED CORRESPONDENCE.

Statement of JOSHUA PIERCE, *of Washington city, District of Columbia.*

The "Catawissa" raspberry, a new variety cultivated by me for two years past, originated in the graveyard of the little Quaker meeting-house in the village of Catawissa, Columbia county, Pennsylvania, situated near the confluence of the Catawissa and Susquehanna rivers. The fruit is medium size, inferior to many of the new popular varieties, but is sufficiently large for all economical purposes. Its color is dark reddish purple when ripe, and it is of a very high flavor. It bears most abundantly after the young wood, on which it produces its best fruit, attains a height of four or five feet, usually beginning to ripen in August, and even sooner. The fruit is produced on branches continually pushing out from all parts, successively appearing in the various stages of growth, from the blossom to perfect maturity; and often there may be counted more than fifty berries on one branch. As the fruit of each branch successively ripens, the later ones gradually diminish in size; but there is no suspension of blooming or fruiting before the plant is checked by frost. If protected in-doors, it undoubtedly would produce fruit during the winter months.

One great advantage of this over other varieties of the raspberry is, that if the stalks should be accidentally broken, or cut off, or should be killed by winter frosts, it is all the better for the succeeding crop. Another advantage is, that from a small space of a few yards, well cultivated, a daily dessert for a small family would always be at hand from three to four months of the year.

Statement of S. S. Boyd, *of Jacksonburg, Wayne county, Indiana.*

The raspberry thrives best in a rich, mellow, moist, deep loam. Chip and other vegetable manure should be abundantly supplied, and the plants well watered in dry seasons. Perhaps a northern slope, or a partially-shaded situation, as near the north side of a fence, would be advantageous to their growth.

We have a variety, though scarce, in this section, which is far superior to any other kind of raspberry I have ever seen. From the little mention made of it in agricultural writings, I am induced to believe it is not generally known in the United States. I suppose it is the same as that known by the name of "Ohio Ever-bearer." The growing shrub can scarcely be distinguished from the common wild raspberry. They are very hardy, not requiring any protection from winter frosts. The fruit is of the same color as the wild raspberry, about twice as large, and of a similar flavor, but more juicy. The superior merits of this variety are its productiveness, and the luscious flavor of its fruit. As its name (ever-bearer) indicates, it continues in bearing from the usual time of ripening until frosts come in the fall. Blossoms, green and ripe fruit are seen upon the plants at the same time. From the experience which I have had with a few plants, I believe that from two square rods of ground, properly cultivated, one quart of fruit may be gathered daily for three months.

Statement of John B. Eaton, *of Buffalo, Erie county, New York, being that portion of his report which relates to raspberries, to the American Pomological Society, at their annual meeting held at the city of Boston in September,* 1854.

Raspberries have been much neglected, and not as largely grown as they deserve to be. The following is a list of those most under cultivation: Falstoff, Franconia, Knevet's Giant, Red Antwerp, and Yellow Antwerp.

Statement of Gershom Wilson, *of Victor, Ontario county, New York.*

Raspberries have never been cultivated here to any considerable extent. I have seen them growing in the gardens of a few individuals in our cities and villages. The varieties mostly cultivated are the red Antwerps, of a dark-red color, large, rich and good; the white Antwerps, yellow, and large in size; the Falstoff, of a purplish-red color, round and large.

The wild black raspberry is thought to be superior in many respects to those above described. I have had some experience with it. I find that it is very easily removed from the fields into the fruit-yard, and as hardy there as the currant. It grows finely and requires no cultivation; in fact, flourishing best in a green sward, and needing only a shovelful of good stable manure thrown around each bush once a year. Six or seven bushes treated in this way will generally produce five or six pecks of delicious berries. This variety seems to do best on very rich, dry, loose land.

The raspberry is so easily raised, and so useful for preserves, ices, tarts, and jellies, and so delicious as a dessert fruit, that its general cultivation should be recommended. It ripens immediately after the strawberry, in June; and by cutting off the stalks over the whole of the roots in April, another set will start up and produce a crop of fruit in autumn.

CRANBERRIES.

CONDENSED CORRESPONDENCE.

Statement of HENRY M. PRICE, *of Nicholas Court House, Virginia.*

The cranberry is indigenous to this county, and might be profitably cultivated. The wild fruit sells here for $2 a bushel.

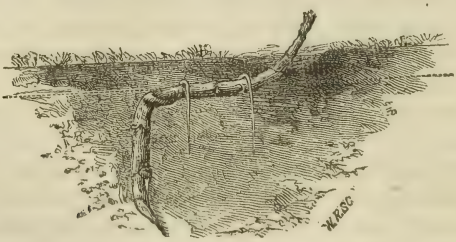
FIGS.

MODE OF STRIKING CUTTINGS.

BY MM. VILMORIN, ANDRIEUX ET CIE., PARIS, FRANCE.

We beg leave to explain a new mode of setting the cuttings of the fig, which may possibly prove interesting to those who wish to propagate this shrub.

The ground being well prepared, we make a narrow trench from an inch to an inch and a half deep, and then drive into the ground the cutting to the depth of about seven inches. The upper part of the cutting is then bent down in the trench and covered with earth to the level of the ground; the top of the cutting, however, must



be bent upwards again and stand out of the ground. We then make around the top of the cutting a small excavation which we fill up with straw, in order to keep the soil in a good condition of moisture. Planted in this way, the cuttings will strike root promptly and vegetate thriftily. To illustrate the manner of planting and to make it more comprehensible, we would refer to the diagram above.

ORANGES.

CONDENSED CORRESPONDENCE.

Statement of John B. C. Gazzo, *of La Fourche parish, Louisiana.*

The fruit-culture of this parish is chiefly confined to oranges, lemons, and bananas. The majority of the orange trees, in this State, were destroyed by the snow and frost of 1851. Our trees yield a full crop once in two years, and entirely fail, perhaps, once in thirteen years. From 300 to 380 bushels of oranges are not unfrequently gathered from an acre of trees.

TAMARINDS.

GROWTH IN VIRGINIA.

BY W. G. SINGLETON, OF WINCHESTER, FREDERICK COUNTY, VIRGINIA.

Of all the ornamental trees propagated among us, either foreign or native, there is none, in my judgment, more desirable than the tamarind. Its growth is rapid; its form symmetrical; its foliage beautifully delicate, and altogether it is highly ornamental. Besides, it is perfectly free from blight as well as from the depredations of insects. If cultivated on our Western prairies, it would doubtless form a valuable acquisition.

From the growth of some tamarind seeds which I obtained at a confectioner's shop, some eight years since, I have a tree standing in my yard eighteen inches in circumference. The past season, it perfected its fruit, which, in quality, was equally as good as that imported. The seed may be sown in drills about four inches apart, and covered from two to three inches deep, with light rich soil. This may be done either in the fall or spring. If in the latter, they should be exposed to the weather during the winter previous, in order that their hulls or coverings may be acted upon by the frost. When grown to a height of three or four feet, the young trees may be transplanted to the sites where they are permanently to remain.

OLIVES.

CONDENSED CORRESPONDENCE.

Statement of JOHN B. C. GAZZO, *of La Fourche parish, Louisiana.*

The olive (*Olea europæa*) is cultivated here for extracting salad oil and for pickling. The trees are planted from 15 to 17 feet apart. When in good condition, the average yield of oil from each tree is from 10 to 15 pounds.

GARDENING.

As frequent applications have been made to the Patent Office for information relative to the cultivation of garden vegetables and flowers, it has been deemed advisable to insert in this Report some general directions on the subject, together with a few of the leading principles which govern this art. This may appear unnecessary to those who are familiar with the pages of the excellent treatises on gardening by Abercrombie, Affleck, Bridgeman, Buist, Cobbett, Comstock, Doyle, Fessenden, Johnson, Landreth, Loudon, Maine, McLeod, McMahon, Schenck, and numerous others; but when we take into account that there are thousands of people in retired or remote parts of the Union, who are not aware of the existence of any of the works named above, it will be obvious that these directions, when read in this volume, will be justly appreciated and thankfully received.

With the permission of Mr. Charles M. Saxton, the agricultural publisher in the city of New York, and of Messrs. Comstock, Ferre & Co., extensive seed-growers, at Wethersfield, in Conn., and at Urbana, Ohio, a free use has been made of their publications in the preparation of this paper, all of which has been carefully considered, and is hereby duly acknowledged. It may be remarked that the directions for cultivation, descriptions of varieties, and calendar of operations, furnished by Mr. Comstock, were almost entirely from his own experience and personal observation. They have been favorably noticed by, and portions of them copied into, the London Gardeners' Chronicle, as well as into some of the horticultural works of France. D. J. B.

THE KITCHEN GARDEN.

A productive garden is not only a luxury and a cause of enjoyment to the farmer or man of wealth, but is also a constant source of amuse-

ment, and supplies many of the wants of the mechanic, as well as of the poor. No laboring man, whether agriculturist or mechanic, is so unceasingly occupied that he cannot spare half an hour each day for his garden; and no professional man, nor any other one confined to in-door employment, who has the command of a rod of ground, ought to be without the exercise and the exertion required for keeping in good order a small garden. His wife and children will be benefited by the light labor; and the mechanic will, by such occasional change from his ordinary employment, secure more constant and vigorous health. The sowing and the cultivation of his vegetables, the blossoming of his trees, and the gathering of his fruits and flowers, will all afford interest and gratification. It is an amusement to be coveted beyond all others, and leads to nothing but good—to nothing sensual or vicious. It cannot give rise to bad habits, but, on the contrary, will serve to protect a man from the allurements of dissipation and vicious indulgences. A garden, in fact, is essential to the health, comfort, and well-being of the mechanic and day-laborer; and it may also be said to be essential to the comfort and enjoyment of individuals of every class.

In the case of the journeyman, or day-laborer, what can be so delightful as half an hour spent in his garden, with his wife and children around him, after his daily toil? The change from laborious exertion to the lightest of all out-door employments must be to him a relief. To the farmer, too, as well as to the professional man, how many broken hours will pass unemployed, and perhaps without enjoyment, if he has not a garden in which to occupy his time, and in which he may occasionally try experiments on a small scale, either for amusement, or for verifying the experiments of others, before carrying them into practice on his farm.

SOIL AND CULTIVATION.

In selecting the situation of a garden, the soil is of secondary importance; for, in this respect, it may be improved every year by trenching, draining, manuring, or by bringing good earth or other materials to the favorite spot. Indeed, some persons choose a heavy, moist, or wet soil for a garden, in order to show their skill and perseverance in its improvement; to which nothing more contributes to its productiveness than trenching the ground deep, and throwing it up into rough ridges for the frost to act upon during the winter, as well as the sun in summer and early spring. The soil, in all cases, when properly prepared, should be deep and rich, and dry and friable enough to admit of cultivation a day or two after a rain, and tenacious enough to withstand a drought.

The best soil for a garden is a rich and deep loam. By a *loam*, is meant a mellow, fertile soil, not stiff and greasy like clay, nor very loose and open like gravel and sand, but having these earths in such proportions as, in the blending, the exclusive characteristics of each disappear. A loam may be clayey, sandy, or calcareous; and when it is dark-colored, abounding in vegetable and animal substances, rotted into earth or vegetable mould, it contains rich nourishment for plants. The most desirable soil for a garden cuts like butter—does not stick obstinately, but is short, tolerably light, breaking into small clods,

is sweet, well tempered, without crusting or chapping in dry weather, or turning to mortar when it is wet. Sandy or peaty soils are specially good for particular kinds of plants, and most flowers; but for general fertility, the soil just described is the best. It may be termed a "sandy loam;" but a "clayey loam"—that is, a loam with a great proportion of clay in it—is suited to many plants; for instance, the common bean. A good under-soil is very important; for a very hard clay below, or gravel, if near the surface, is very bad, though in opposite respects. A hard clay bottom will not allow the rain which falls to pass through it. Hence the upper soil will be in a state of mortar during winter, and in spring and summer it will harden and crack. If a too open under-soil be near the surface, the rain will pass downwards too rapidly. A soil resting on a rock is often shallow, poor, hungry, and quickly becoming dry after a rain. A chalky soil is very good, provided there be a sufficient depth of earth over it; if it be mixed with sand, it is extremely good for a garden. The best kind of under-soil is a sandy or calcareous one, that will allow moisture to pass with moderate rapidity through it; such an under-soil, having no bad qualities in it, will nourish the roots of plants that strike deeply, instead of stopping or preventing their extension.

In respect to the situation of a garden, it ought to have a southern aspect, slightly inclined towards the east, in a northern climate, and it is desirable that it should be within sight of the house.

According to Cobbett, it is advantageous to have the northerly end of the garden quite level, and the remainder sloping gently towards the south. He asserts that some plants, such as the strawberry, produce more abundantly upon level ground, from which moisture does not escape too quickly; and that others, such as early broccoli, early cabbage, winter spinach, and early peas, succeed best on a slope, say about one foot in thirty, which prevents the accumulation of water, in winter, about their roots. A flat garden, however, will be found the most luxuriant in summer, when it is most desirable that the moisture should not run away. If practicable, a small stream of water should be brought into the garden by means of a water-ram, or some other economical contrivance, which will be a great convenience for irrigating the beds in dry weather. If a stream is not at hand, water may be caught in cisterns or tanks from the farm buildings, and distributed to the plants by means of gutters or pipes.

ENCLOSURE AND LAYING OUT.

A garden should be well protected from animals, and chilling or tempestuous winds, by a substantial enclosure, consisting of a good wall of earth, brick, or stone, or by a close board fence or quickset hedge. If it be of a good size and properly attended to, it will afford an abundance of excellent vegetables, as well as of fruit, for family use. Cherry and plum trees may be planted near the house, as they would not be so liable to be attacked by pilferers and birds; summer pears and apples next, and winter and baking sorts farthest off. Gooseberries, currants, and strawberries will grow between the standard fruit trees, or around the beds or plots of vegetables. Raspberries and flowers

may be planted along the borders and walks. Early peaches, apricots, nectarines, vines, and figs, in a northern climate, may be trained near the sunny sides of the buildings or walls.

A garden is best laid out in rectangles, varying in dimensions according to its size and shape. These should be separated by alleys from three to four feet in width, crossing each other at right angles, and intersecting the principal walks. In a large garden, it is desirable that there should be five of these, one along each of the four walks or other boundaries, and another across through the centre. In small or moderate-sized gardens, fewer alleys, or walks, will be necessary. The manner of laying out and making walks is as follows: First, leave a border next the walls or hedges as wide as the wall is high; then, with a line, mark out the width of the walk, or path, dig the mould out of this space, and spread it over the borders or beds, filling the hollow with stones, brick-bats, or other dry rubbish, on the top of which a coat of gravel may be laid six inches thick. If the under-soil be quite dry, no rubbish will be necessary. An edging of dwarf box may be planted with regularity along the borders of the walks, which should be kept closely clipped at the height of three inches, to prevent the harboring of slugs or snails. The best way of laying out a garden on very sloping ground is in flat terraces, or steps, one above another.

PREPARATION OF THE SOIL.

A garden is such a source of pleasure and comfort that no trouble ought to be thought too great for improving it; but, fortunately, in many cases, the materials which are most wanted to improve the quality of the surface soil are found directly under it, and only need be dug up and mixed with it. For instance, a clay soil can be rendered less clayey, after it is deeply drained, by mixing with it gravel or sand; and a sandy or gravelly soil may be made more solid by mixing with it a good quantity of clay; so may the most spongy peat be reduced to a solid and fertile soil by being incorporated with other earths and with manure. A clayey soil may also be made lighter by mixing with it road-scrapings, coal or wood ashes, building rubbish, or any other substances that will tend to separate the particles of clay.

The best preparation of the soil for a new garden, after the necessary draining, is trenching it to the depth of two feet, and laying a liberal supply of dung at the bottom. If the surface be a thick sod, or lea, that should likewise be laid at the bottom, where it will serve partly as a manure. The soil should be "ribbed up" so as to expose as much of it as possible to the action of the frost, which causes stiff land to crumble to pieces, and is also beneficial in killing the roots of weeds, and the eggs and larvæ of insects or worms. The "ribbing" is done by placing three spades of earth, one above the others, in the course of the digging. It is not necessary, however, to rib the whole of the surface soil, as those spaces which are intended for the immediate planting of fruit trees, or to be otherwise cropped before early spring, need not be done. Every vacant space which is not to be ridged or trenched in winter, ought to be thoroughly and deeply dug before cold weather sets in, to clear the ground of the roots of weeds,

and to bring up such manures as may have filtered downwards, to the action of the frost. On a deep winter digging, the productiveness of the next year's crop mainly depends. It is the foundation of all good culture in climates subject to frosts, and is so needful a preparation that if it be neglected, the failure of many crops will be certain.

MANURES.

There are so many kinds of manure, and such a variety of modes of applying them, that it would be useless to attempt a description of them here. As a general practice, stable or barnyard dung, sufficiently rotted to destroy the vitality of the seeds of weeds and other foul plants contained in it, well incorporated in the soil, perhaps, is the best manure for a garden that can be applied. A compost made of a mixture of the dung of various kinds of animals, and the refuse of decaying parts of garden vegetables, or the leaves of trees, doubtless is one of the most appropriate fertilizers that can be applied. In cases where these manures cannot be obtained, guano, poudrette, bone-dust, super-phosphate of lime, charcoal, gypsum, (plaster of Paris,) oyster-shell lime, common salt, or dressings of soot, wood ashes, soap-suds, or other liquid manures, may be used with advantage instead. All of these, however, should be cautiously employed, as a misapplication would often be followed by injurious results.

As a general rule, the dung should be dug into the squares of the garden which requires manuring, as well as into the borders designed for roses and other flowers; and if the soil be poor, it ought to be mixed with it throughout. The parts intended for parsnips, carrots, and beets should always be dunged, at the winter digging, as experiment has proved that if the seeds of these plants be sown in freshly-manured ground, the roots are apt to fork, or run to "fingers and toes;" that is, to divide into two or more irregular parts. The best mode of using stable or yard manure is in a compost, as most of the garden productions, stone fruits, flowers without exception, and small seeds generally, are raised from fertilizers in this form. Horse-dung is used for hot-beds, and when perfectly rotten, it is adapted for most kinds of plants. Cow-dung may be advantageously mixed with it, in many cases; and from the slowness with which cow-manure decays, it may be almost universally employed for bulbs. But after all, liquid manure, whether directly from the cattle, or made from water poured on the dung of cows or sheep, collected in a vessel prepared for the purpose, if judiciously applied, is perhaps the most active of all fertilizers, guano not excepted.

SELECTION OF SEEDS AND TESTING THEIR VITALITY.

In choosing seeds, the fullest and plumpest in form are the best, and the plants springing from them will be strong or feeble, according to their vigor. As a general rule, old seeds are not to be depended upon. Those which are of an oily character, in particular, very soon fail after maturity; while others, if kept in a cool, dry state, retain their vitality for a considerable length of time. The keeping of them damp, which

makes them grow, if properly sown, causes seeds to rot when not sown.

The vitality of some of the more common garden seeds, when kept under favorable circumstances, may be relied upon for the following periods:

Parsnip, rhubarb, and other thin scaly seeds, for one year.

Balm, basil, beans, cardoon, carrot, cress, Indian cress, lavender, leek, okra or gumbo, onions, peas, peppers, rampion, scorzonera, thyme, tomato, wormwood, and small herbs, in general, for two years.

Artichoke, asparagus, corn-salad, egg-plant, endive, Indian corn, lettuce, marigold, marjoram, mustard, parsley, rosemary, rue, skirrit, spinach, and tansey, for three years.

Borage, borecole, broccoli, Brussels sprouts, cabbage, cauliflower, radish, sea-kale, tarragon, and turnips, for four years.

Beet, burnet, celery, chervil, cucumber, dill, fennel, hyssop, melon, pumpkin, sorrel, and squash, five to ten years.

In order to test the vitality of seeds, sow a few in a pot or box of earth, and keep it warm and moist, exposed to the sun for a while, and if good, they will begin to sprout and grow; by counting the number of growing ones, the proportion of living to dead seeds can be approximately ascertained, and the quantity of seeds to be soon calculated.

Onion seed, soaked a few minutes in cold water, and then boiled half an hour in hot water, will begin to germinate, if vitality remains.

Indian corn, peas, and numerous other seeds, soaked four hours in a tepid solution of chloride of lime and water, mixed in the proportion of one-fourth of an ounce of the lime to a gallon of water, and then sown in the ordinary way, have been known to throw out germs in twenty-four hours.

The seeds of common garden cress, immersed in oxygenated muriatic acid, will germinate in six hours; whereas, when immersed in water alone, they will not show signs of vegetation in less than thirty hours.

Steeping in tepid water for twenty-four hours to forty-eight hours, and then coating them in plaster or ashes, will hasten the germination of most dry and hard seeds.

An interesting series of experiments were recently made in England by Mr. Charles Darwin, with the view of ascertaining the power of resistance in seeds to the injurious action of sea-water. As they have a direct bearing on the practicability of shipping seeds to this country from abroad, which are liable to be exposed to salt water in the hold of the vessel, I give in a condensed form the results, as published in the London Gardeners' Chronicle of May 26, 1855.

The water employed for the experiment was made artificially, and had been tested by numerous sea animals and algæ, which had lived in it for more than a year. The seeds were placed in separate bottles holding from two to four ounces each, out of doors in the shade; the mean temperature of the water during the period of immersion of the seeds being about 44° F., but rising one week to a mean of nearly 48°. Most of the seeds swelled in the water, some of them slightly coloring it, and each kind giving to it its own peculiar and strong odor. That in which the cabbage and radish seeds were placed became putrid,

and smelt offensively in an extraordinary degree. Some seeds were also placed in a quart bottle in a tank filled with snow and water, to ascertain whether they would better resist the salt water at the temperature of 32°. This water, like that in the small bottles, likewise became turbid, and smelt rather offensive.

The seeds of the common cress germinated well after forty-two days' immersion; they gave out a surprising quantity of slime, so as to cohere in a mass. Radishes germinated not quite so well after the same period. After fourteen days' immersion, only one cabbage seed came up, out of many; in the ice-cold water, however, several came up after thirty days' immersion. Lettuce-seed grew well after forty-two days. Of onion seed, only a few germinated after the same period. Carrot and celery seed came well after forty-two days. Borage, capsicum, and squash (*Cucurbita ovifera*) germinated well after twenty-eight days' immersion. The last two, being rather tender kinds, were also tried in the ice-cold water, and germinated in thirty days. Savory grew not quite so well in twenty-eight days. Out of a mass of good flax-seed, which gave out much slime, only one seed came up after twenty-eight days' immersion. The same thing happened after fourteen days; and only three seeds came up after the first seven days. Rhubarb, beet, orach, oats, barley, and Canary seed, all germinated excellently well after twenty-eight days; in ice-cold water, after twenty days. Of beans and furze, only a few survived with difficulty after fourteen days. The beans were all killed by thirty days' immersion in the ice-cold water. Peas germinated after seven days, but were all killed by fourteen days' immersion out of doors; and likewise after thirty days in ice-cold water. Trifolium incarnatum is the only plant of which every seed was killed by seven days' immersion; nor did it withstand thirty days in the ice-cold salt water. Kidney beans were tried only in the cold water, in which their vitality was destroyed in thirty days. It may be remarked that the germination of the rhubarb and celery, alone, were altered in any marked degree, having been accelerated. Several seeds of Convolvulus tricolor, not included in the above list, it may be mentioned, germinated and came out of their husks, while still in the salt water, after six or seven days' immersion.

PERIODS OF SOWING.

It has long been observed that nature, in her operations, is so uniform, that the periods in which certain plants and trees unfold their flowers and leaves, is an unerring indication of the forwardness of spring. By *spring* is meant the period when vegetation starts; when buds begin to swell, or when the leaves or flowers put forth or unfold. The time when our common cultivated fruit trees exhibit the petals of their flowers, with few exceptions, is the proper season for sowing gardens in general, in open culture; but for some months later, the seeds of many kinds of vegetables are sown for succession, or for the next year. Some few sorts, as cabbages, lettuces, carrots, peas, beans, &c., are sown in autumn or early winter, to take their chances of resisting the frost, and coming in early the next summer or spring.

The following table will serve in some measure as a guide for general sowing near some of the principal points in the Union.

Period of flowering of orchard fruit trees.

Names of places.	Lat.		Lon.		Plum.	Pear.	Peach.	Cherry.	Apple.
St. Mary's, Ga., and southward.	30°	43′	81°	40′	....	....	Oct. 21 to Feb. 20	....	Oct. 21 to Feb. 20
Natchez, Miss	31	34	91	24	Jan. 23 to Feb. 15	....	Feb. 15 to March 1	Jan. 23 to Feb. 15	Mar. 4 to Mar. 27
Savannah, Ga	32	4	81	5	Feb. 15 to March 1	....	Feb. 15 to Feb. 28	February 25	March 1
Tuscaloosa, Ala	33	12	87	42	February 15	April 1	April 20	....	April 1
Camden, S. C	34	17	80	33	....	....	February 26	....	March 17
Chapel Hill, N. C	35	54	79	17	....	Mar. 15 to Mar. 19	Feb. 28 to March 2	March 6 to April 4	Mar. 12 to Mar 26
King George C. H., Va	38	14	77	4	April 15	April 8 to April 11	March 15 to April 12.	March 28 to April 11.	April 1 to April 23
Baltimore, Md	39	17	76	36	....	....	March 30 to April 12.	April 4 to April 16	April 10 to April 25
Indianapolis, Ind	39	55	86	5	....	....	April 6	April 6	April 6
Columbus, Ohio	39	57	83	3	April 14 to April 25	April 8 to April 27	April 5 to April 27	April 9 to April 29	April 8 to May 5
Philadelphia, Pa	39	58	75	9	....	....	April 1 to May 15	April 7 to May 22	April 12 to May 25
Athens, Ill	40	00	89	55	....	April 19 to April 28	April 13 to April 25	....	April 21 to April 25
Perth Amboy, N. J	40	35	75	00	April 26 to May 7	....	April 11 to May 6	April 18 to May 7	April 26 to May 9
New Haven, Conn	41	18	72	55	....	....	April 24 to May 11	April 29 to May 8	May 6 to June 3
Sandusky, Ohio	41	20	83	15	April 30	....	April 12 to May 1	April 21 to May 4	April 28 to May 13
Muscatine, Iowa	41	30	91	10	May 3	May 3 to May 6	April 30 to May 3	May 1	May 3 to May 8
Meadville, Pa	41	40	80	2	....	May 12	May 7	....	May 15
Cambridge, Mass	42	22	71	7	April 30 to May 12	April 30 to May 12	April 28 to May 16	May 2 to May 25	May 6 to May 28
Londondery, N. H	42	53	71	20	....	May 15	May 1 to May 17	....	May 21 to June 4
Madison, Wis	43	5	89	30	....	....	April 30 to May 5	May 1 to May 15	May 4 to May 18
Rochester, N. Y	43	8	77	51	....	May 7 to May 11	May 5 to May 16	May 15 to May 16	May 13 to June 1
Saco, Maine	43	31	70	26	May 5	....	....	May 5 to May 15	May 13 to May 20
Montpelier, Vt	44	17	72	36	....	....	May 25	May 10 to May 25	May 20 to June 10
Belfast, Maine	44	25	71	00	....	....	May 28	June 1	May 30

It is to be understood, however, that all seeds sown at the times of the flowering of the fore-named trees will not certainly spring up and grow; for this, after all, will depend upon the state of the soil, whether stiff, moist, or dry, the prevalence of rain, and the occurrence of frost or blighting winds. For instance, many kinds of seeds, as cabbages, radishes, carrots, beets, delicate flowers, &c., followed, when sown, by a drought of several weeks, with the surface of the ground heated to a high degree by the sun, will fail to grow. The effects will prove equally disastrous by long-continued rains, which will surfeit the ground with moisture or incrust the surface with a dense stratum of clay.

Dry weather is the best for sowing, because the earth is then in a pulverulent or crumbling state, fit to receive the seeds, instead of clogging around them, and when the rake or other implement for making the surface perfectly free and fine can be used with the most effect.

With regard to the depth necessary to cover the seeds, experience teaches the gardener better than any rules which can be given. It is obvious that a small tender seed requires the merest sprinkling of sand or very light loam, barely enough to shade it and preserve moisture; whereas a bean or pea, which has a very tough covering, will bear a heavy coat of clay, and will soon force its way through it, when other seeds would not vegetate at all. In a sandy soil, seeds may be covered deeper than in a clayey one; an inch of clay might smother a seed which could bear an inch of sandy loam without injury or loss. Again, it is a mistake to suppose that all kinds of seeds must be well buried, in order that the young plants proceeding from them may have a good hold of the ground; because seeds, in general, when they begin to grow, plunge their roots downwards and throw their stems upwards; consequently, all the spaces between the surface of the soil and the seeds are occupied by the lower parts of the stems and not by the roots.

The following table shows the quantity of seeds usually sown in a garden of half an acre. A larger or smaller piece of ground will require seeds in the same proportion

Asparagus	1 oz.	Melons	½ oz.
Beans, an assortment	3 quarts.	Onions, an assortment	2 oz.
Beets, an assortment	4 oz.	Okra, or gumbo	½ oz.
Broccoli	¼ oz.	Parsley	1 paper.
Cauliflower	¼ oz.	Parsnips	1 oz.
Cabbage, an assortment	4 oz.	Peppers	1 paper.
Celery	¼ oz.	Potatoes	1 bushel.
Cress	8 oz.	Pot herbs	3 papers.
Cucumber	½ oz.	Pumpkin	½ oz.
Carrot	1 oz.	Peas	8 quarts.
Early corn	1 quart.	Radish	8 oz.
Egg-plant	1 paper.	Salsafy	½ oz.
Endive	½ oz.	Squash	½ oz.
Leek	½ oz.	Spinach	8 oz.
Lima beans	1 quart.	Sweet herbs	3 papers.
Lettuce, an assortment	1 oz.	Tomatoes	1 paper.
Mustard	4 oz.	Turnips	2 oz.

The following table will be found useful for readily determining the number of hills, plants, trees, &c., which may be grown on an acre of land, where sown or planted at any of the distances apart as indicated below. If the quincunx method be adopted, an acre will contain nearly one-eighth more:

Distances apart.	Number of plants, &c., to an acre.
3 inches by 3 inches	696,960
4 " by 4 "	392,040
6 " by 6 "	174,240
9 " by 9 "	77,440
1 foot by 1 foot	43,560
1½ " by 1½ "	19,360
2 feet by 1 "	21,780
2 " by 2 feet	10,890
2½ " by 2½ "	6,969
3 " by 1 foot	14,520
3 " by 2 feet	7,260
3 " by 3 "	4,840
3½ " by 3½ "	3,555
4 " by 1 foot	10,890
4 " by 2 feet	5,445
4 " by 3 "	3,630
4 " by 4 "	2,722
4½ " by 4½ "	2,151
5 " by 1 foot	8,712
5 " by 2 feet	4,356
5 " by 3 "	2,904
5 " by 4 "	2,178
5 " by 5 "	1,742
5½ " by 5½ "	1,417
6 " by 6 "	1,210
6½ " by 6½ "	1,031
7 " by 7 "	888
8 " by 8 "	680
9 " by 9 "	537
10 " by 10 "	435
11 " by 11 "	360
12 " by 12 "	302
13 " by 13 "	257
14 " by 14 "	222
15 " by 15 "	193
16 " by 16 "	170
16½ " by 16½ "	160
17 " by 17 "	150
18 " by 18 "	134
19 " by 19 "	120

TABLE—Continued.

Distances apart.	Number of plants, &c., to an acre.
20 feet by 20 feet	108
25 " by 25 "	69
30 " by 30 "	48
33 " by 33 "	40
40 " by 40 "	27
49½ " by 49½ "	16⅔
50 " by 50 "	17
60 " by 60 "	12
66 " by 66 "	10

WATERING, OR IRRIGATION.

As watering will sometimes be necessary to assist the germination of seeds after they are sown, if the weather be dry, and the growth of the plants after they are up, due precaution should be observed as to the time of performing the operation. As a safe rule, neither seeds nor plants should be watered except when the sun has gone down; because its rays act suddenly upon the moistened plants, and destroy their leaves, as if by frost; and upon moistened ground, where the seeds have not yet appeared, the effect of watering in sunshine would be to draw forth the moisture from the place watered, and make it dryer and harder than before. Watering in sunshine causes the leaves to blister. In viewing nature when rain is falling, the cloud from which it descends acts as a screen between the earth and the rays of the sun. This shows that watering, which is a substitute for natural rain, should not be applied when the sun is shining. When summer rain is falling, the air becomes moist, and the sun, while its warmth is still acting, does not counteract by its fiery rays the good effects of that moisture, and the soil is then softened and disposed to the entrance of the genial rain; everything then favors the growth of the plant. But this is not so when artificial watering takes place. The air is then dry, and the sun draws away, early in the morning, the moisture which the watering imparted the evening before. The most beneficial watering is that which is applied before rainy weather, because, in such case, its good effects are not counteracted by the rays of the sun.

The best water for using in a garden is that which contains an abundance of fertilizing substances, such as that from cess-pools, ponds, &c. Rain water also is good. When spring or well water alone can be obtained, it should be exposed for some time to the sun and air before it is used.

A good liquid manure for watering plants may be made by mixing twelve gallons of water with four pounds of Peruvian guano, and allowed to stand twenty-four hours. The liquid may be applied with great advantage, particularly to flowers in pots, which would otherwise

have been killed if the guano had been administered in a dry state. The same guano will serve three times, each time being covered with twelve gallons of water.

HOEING AND WEEDING.

One of the most important points to be observed in the management of a garden, is to stir the soil often during the season, particularly in time of drought, in order to prepare it more readily to receive and retain moisture from the atmosphere, and to prevent the plants from becoming stunted in their growth. But, let it be remembered, *never work the ground when it is heavy or wet;* for this will render it lumpy or compact during the rest of the season.

The hoe is the most convenient implement for cutting away the young annual weeds from every space where it can be introduced without injury to the plants that remain; but the fore-finger and thumb must also be used among the close-growing plants, such as onions, carrots, and parsnips, to thin and completely clear them from the weeds which the hoe cannot touch without hurting or cutting away the others. Among vegetables such as turnips, cabbages, peas, beans, &c., the hoe executes the work well. All that the gardener can safely do, in general, is to remove the weeds as they come up, and thus prevent the exhaustion of his ground and the injury of his plants through their means. A stirring and cleansing of the soil is the best remedy one can recommend.

APPROVED SPECIES AND VARIETIES OF PLANTS—GENERAL DIRECTIONS FOR CULTIVATION.

ARTICHOKE.

(Cynara scolymus.)

The common artichoke is a perennial, from Barbary and the south of Europe, cultivated for more luxury than profit. The flower-heads, in their immature state, contain the edible part, which consists of that portion of the fleshy receptable that adheres to the scales, called the "bottom." It is entirely different from the Jerusalem artichoke, which produces tubers that are so difficult to eradicate when once introduced into a garden.

The two principal varieties are the "Globe," erroneously called "Green Globe" in the catalogues, and the "French" or "Green." The former produces large globular heads, of a dusky purple color, with thick, succulent scales, and is the best for general culture. The latter has a large oval head, with open scales, and is much esteemed by the French. The heads are boiled, and eaten with butter and salt. The bottom of these heads is very fleshy, and is cooked in various ways, sometimes being dried for winter use. The Italians make a preparation called *gobbo*, by bending down the stem of the plant to a right angle, and binding together the stalks and leaves, which they cover over to blanch. The result is a lump, which is eaten raw in winter, with salt, as a substitute for radishes.

The artichoke may be propagated by offset-suckers, separated in the spring. When raised from seed, let them be sown early in the spring, in drills a foot apart, and four inches asunder along the drills. The next spring, transplant to permanent beds in hills, three feet apart each way, with three plants to a hill. It requires a deep, rich loam, abounding in moisture, and to be protected in winter by covering with litter or earth. Its culture in this country is confined principally to the South.

ARTICHOKE, JERUSALEM.

(Helianthus tuberosus.)

This plant flourishes best in a light, rich soil, with an open exposure; but it will resist any degree of cold incident to the United States. It may be cultivated by planting middle-sized tubers or cuttings of the large ones, with one or two eyes preserved in each, at the period of the flowering of the peach, and even earlier if the ground will admit. The only attention necessary in its culture is to loosen the surface, a little of the earth being drawn up about the stem. The roots may be increased in size by pinching off the tops just previous to flowering.

The tubers may be taken up in the autumn as wanted for use; and as soon as the stems have entirely withered, they may be raised from the ground, as completely as possible, and preserved in sand for winter consumption.

ASPARAGUS.

(*Asparagus officinalis.*)

A perennial, cultivated for the early shoots, which are highly esteemed. There are several names given in some catalogues, which indicate different varieties, but there are only two of distinct character. The kind with reddish-purple shoots, growing close headed to large size, is more generally cultivated, and is sold under the name of "Giant." The other variety is of a bright green color, with a round top. Either will grow to a large size in good soil, with proper management.

Soak the seed twenty-four hours in tepid water, and sow very early in spring, thinly, in rows a foot apart, and keep clean by frequent weeding and hoeing. At one or two years old, transplant to permanent beds. Many persons are apt to think the largest of everything among vegetables is the best, and usually order two or three-year-old roots; but, in my opinion, good-sized asparagus roots of one year's growth are decidedly preferable for making new beds. The ground should be trenched, or dug over, two feet deep, burying plenty of manure, and mixing it thoroughly with the soil. Lay out the beds four and a half feet wide, and draw three drills, fourteen inches apart, and six inches deep, lengthwise of each bed; place the roots in them, a foot apart, in their natural position, and cover four inches deep. A rich sandy loam is most suitable. Every autumn, after clearing off the stalks, spread on a covering of manure, to be forked in, with a good dressing of fine salt, very early in the spring. A new bed should not be cut over before the third year.

A thick, compact head of tender asparagus may be formed by in-

verting a common wine bottle over a shoot just rising out of the ground, and securing it in that position by three small stakes. The bottle will soon become filled, when it must be broken to obtain the head.

BALM.

(*Melissa officinalis.*)

This hardy, herbaceous plant has a citron-like scent and an aromatic flavor. It is principally cultivated for making a grateful drink for the sick. The soil best suited to its growth is one which is rather poor and friable, but more inclined to clay than sand; manure is never required. In a high northern climate, an eastern aspect is best. It is propagated by root-division, of which the smallest piece will grow, and by slips of the young shoots. By the first mode, any time during the spring and autumn will answer, but by slips only in May or June. If divisions of an old plant are employed, they may be planted at once where they are to remain, a foot apart; but if by slips, they must be inserted in a shady border, to be thence removed late the following autumn to their final sites. At every removal, water must be given, if the weather be dry, until they are established. During the summer, they require only to be kept clear of weeds. Late in autumn, the old beds, which may stand for many years, require to be dressed, their decayed leaves and stalks cleared away, and the soil loosened by the hoe.

The plants may be gathered for drying about the time of flowering; but if the leaves are required to be used green, at any season they can be obtained. For drying, the stalks are cut with their full clothing of leaves to the very bottom, and the drying gradually completed in the shade.

BASIL.

(*Ocymum basilicum.*)

Of basil, there are two kinds, the sweet-scented (*O. basilicum*) and the dwarf bush, (*O. minimum*,) the qualities of both of which are the same, but the former is principally cultivated for culinary use. The young leaf-tops are employed in making salads and soups, their flavor resembling that of cloves. The supply is never failing during summer, in a mild climate, as they shoot out rapidly for successive use.

In a northern climate, the seed is sown on a very gentle hot-bed, under glass, about the end of March or the beginning of April. To raise plants for the principal or main crop, the frames should be filled with earth to within three or four inches of the glass, or very shallow frames may be used. When the plants are up, give a little air by tilting the lights; and as they advance, and the weather becomes warmer, give them more air, until the lights may be taken off altogether during the day, and put on at night. By the above management, good hardened plants will be fit for removing towards the end of May or the beginning of June, into warm borders or beds of light, rich earth. If the weather be dry at the time of planting out, let the beds be previously well watered, and the planting done in the evening. Lift the

young plants from the seed-beds with a small fork or trowel, and insert them with care from eight to ten inches apart each way, and water them to settle the earth to the roots. Attend to earth-stirring, and water when required, until the plants are well established. If green tops are required for earlier use, sow in pots, pans, or boxes, and place in any heated structure having a due degree of temperature.

BEANS.

(*Vicia faba—Phaseolus vulgaris.*)

ENGLISH DWARFS.

The English dwarf beans, called by the French *Fève de marais*, are not much cultivated in this country, being unsuited to stand the heat of our summers. They grow about three feet high, with thick, angular stems, and have white and black flowers. There are many varieties, but the two following are most in use:

Early Long Podded.—Grows about three feet high, with long and narrow pods, closely filled; beans oblong, middle size; a great bearer.

Broad Windsor.—This is one of the largest kinds used for the table. The seeds are large, broad, and flat. It grows three feet high, and is more cultivated in gardens than any other sort.

Plant as early in the spring as the ground can be worked, two inches apart, in two-and-a-half feet drills. When they are in full bloom, and the lower pods set, pinch off the tops. This will insure the filling of the pods, and hasten maturity. A strong, heavy soil, with a considerable proportion of clay, is preferable. Remember they do not succeed well unless planted very early.

KIDNEY DWARFS, OR SNAPS.

Under this name are classed all the low-growing sorts, called in different catalogues, *Bush*, *Bunch*, *Snap*, *String* or *French Beans.* They are so extremely sensitive of frost and cold, that it is useless to plant them before the middle of spring, when the ground has become light and warm. Hoe often, to stir the ground, but only when dry, because earth scattered on the leaves, when wet with dew or rain, will rust them and greatly injure the crop. Plant two or three inches apart, in two-and-a-half feet drills. They do best in light, rich soil.

Early Mohawk.—This is considered the hardiest, and on that account answers best for the first planting. It will endure a light frost without injury, and continues a long time in bearing, if the green pods are often gathered. Pods, pale green, long, and flat; seeds large, kidney-shaped, brown, and purple-marbled.

Early China.—A very early and excellent variety, both for snaps and for shelled beans, green and dry. It is a great bearer, and much esteemed in farm cultivation. Pods, medium size, and full; seeds white, with a bright-red eye, and a round oval shape.

Early Yellow Six-weeks.—A small, round, oval bean, color dark orange; of dwarfy growth; quite early, and a good bearer; used mostly in the pods.

Early Cluster.—This is a small, early variety, with dark green leaves and pods. It is very productive, and used both green and dry. Seeds white, flat kidney-shaped.

Early Valentine.—A most excellent sort for snaps only, having round, fleshy pods, which remain a long time brittle and tender. Beans long, light red, and salmon-color marbled, sometimes shrivelled; very early, and a good bearer; getting to be very extensively cultivated.

Refugee or Thousand-to-One.—This is a late, round-podded variety, of very strong growth, sometimes called "Purple-speckled Valentine;" beans brown and purple-speckled. There is a long and an oval-seeded variety; the oval has more round and fleshy pods. Both should be planted in hills, on account of their branching habit.

Large White Kidney or Royal Dwarf.—This is one of the best late kinds; pods long, and rather flat; beans white, long, and round kidney-shaped. Excellent green, and equal to any in a dry state. A good sort for field culture.

Haricot flageolet à grain vert, a French variety, of dwarfy growth; excellent for the table, green or dry.

POLE OR RUNNING BEANS.

All described under this head require poles eight or ten feet long. They are planted at the same time with the dwarf beans, and, like them, require a warm, mellow soil. Stick the poles three feet apart each way, raise a hill, and plant around them six or seven beans; cover an inch deep with light, mellow earth.

Early Dutch Case-knife is the earliest, with very long, flat pods. It is sometimes used for snaps, but principally shelled. Beans white, flat kidney-shaped, and very good, green or dry; an abundant bearer.

Large French Soissons.—A large white bean, flat kidney-shaped, a little crooked. In growth, it resembles the Case-knife, except that the pods are not so flat nor so long, and not as early; excellent shelled, green or dry.

Horticultural Cranberry.—A medium-sized oval bean, light red and cream color, speckled; pods striped with red; used both in the pod and shelled. A standard sort in general cultivation; very productive, and good dry.

White Cranberry.—Beans white, and of the same shape, but smaller, than the Horticultural; pods rather more round; very tender and richly flavored, but rather a poor bearer.

Red Cranberry.—Color, deep red; in growth similar to the white, but more productive; the pods are not so tender.

Indian Chief.—This variety is not much known, although it is the best of all pole beans for cooking in the pods, which are tender and delicious when the beans are fully grown; beans nearly round, black; pods white; a good bearer, but late.

Large Lima.—A very large and late bean, forming with the Sieva a distinct class, with broad, rough pods; seeds white, broad, and rather full. It runs very high, and bears profusely until killed by frost. The beans are very apt to rot when planted too early. After raising the hills higher than for the other sorts, stick the beans around the poles

with the eye downwards, and cover about an inch, lightly, with the hand. This should be done in warm sunny weather, and after rather than before a heavy rain. It s the best of all shelled beans. Plant three and a half feet apart.

Carolina, Sieva, Saba or Small Lima.—Resembles the Large Lima in growth, but is inferior to it in rich, buttery flavor. It is earlier, more hardy, and more sure to produce a crop. Seed smaller, white, and quite flat.

Scarlet Runner.—This and the "White Runner" are distinct varieties, with dark green leaves, and large rough pods. Flowers bright scarlet, standing out from the foliage in great profusion; seed very large, kidney-shaped, purple and brown marbled.

White Runner.—Like the scarlet, except in the color of the seed and flowers, which are pure white. These two kinds differ from all the others in coming out of the ground with the seed-leaves detached. They are both quite ornamental.

Newington Wonder.—An early and most prolific bearer; pods long and slender, filled with small drab-colored beans. Best for forcing.

BEET.

(*Beta vulgaris.*)

The beet in some of its varieties is universally cultivated in this country, even in the smallest vegetable gardens, and is used in all stages of its growth. For early beets, sow as soon as the ground will admit, in drills fourteen inches apart, and thin to six inches. For winter, sow about the middle of spring. All the varieties succeed best on a deep, rich sandy loam, and require to be thinned when small, and kept clear from weeds. Soak the seed for the fall and winter crop twenty-four hours in warm water; drain it off, and keep covered till it begins to sprout; then roll it in plaster, and sow immediately in fresh prepared ground. The weeding will be half saved.

Early Flat Bassano.—This variety, from Italy, is valued here principally for its earliness, coming into use a week or ten days sooner than any other sort. Roots flat, turnip-shaped, light red; flesh white, circled with rose-color; leaves very small, light green, veined with red. It is very tender and juicy, and will grow to good size on light soil, but will not keep through the winter unless sown quite late.

Early Blood Turnip.—The standard early sort. Blood red, turnip-shaped, with small top, tap-root; very tender, and good for early use and late keeping. It is indispensable in every garden, however small.

Early Yellow Turnip or Orange.—Is longer oval-shaped than the Blood turnip; flesh yellow, very tender and juicy. It keeps well, and will serve for both summer and winter.

Early Half-long Blood.—Intermediate between the Early Blood turnip and Long Blood, both in shape and earliness. It grows pretty large and tender, and keeps well.

Long Blood Red.—The common long winter variety. Deep red; grows to large size, mostly in the ground; is sweet, tender, and keeps well.

Smooth Long Dark Blood.—This fine sort was introduced a few years ago from Germany. It is a long smooth beet, growing to good size, half out of the ground, with few or no side roots; color, dark blood

red; top, small dark red and upright growth; keeps well. Sow in drills fifteen inches apart, and thin to eight inches. It is apt to be tough when sown too early.

Early Scarcity.—A light red beet, growing much out of ground, to a very large size in good soil. It is much like the Mangold Wurzel, differing from it in being more turnip-shaped, with smaller tops. This and the two following require to stand one foot apart in two-foot drills, to attain their full growth.

Long Red Mangold Wurzel.—A large long variety, grown for stock-feeding. It stands a good deal out of the ground; color, light red; flesh white and rose-colored; leaves green, veined with red. It is early, and is sometimes used for the table when young.

Yellow Globe Mangold Wurzel.—A large, round, orange-colored variety, of excellent quality, which keeps better than the Long Red, and produces better crops on shallow soil.

White Sugar.—This grows to large size, much above ground; roots half long, white; leaves green; considerably grown in this country for feeding, but is inferior to the Mangold Wurzel for that purpose. In France, it is cultivated extensively for the extraction of sugar.

Swiss Chard or Silver.—This variety of beet, sometimes called "Sea kale beet," is cultivated for its leaf-stalks, which are served up much like asparagus, and for its leaves, cooked like spinach. If cut often, new and more tender stalks will be reproduced.

To keep beets through the winter, bury them in long narrow trenches mixed with sand, below frost, or cover them with sand or light earth in the cellar. Beets should not be allowed to wilt. If they once become shrivelled, they will never, like carrots, recover their firmness and brittle quality.

BENE PLANT.

(Sesamum orientale.)

This plant was introduced into the Southern States by the negroes from Africa. Soninni and Brown, travellers in Egypt, say it is much cultivated there for the purpose of feeding horses, and for culinary purposes. The blacks in Georgia boil a handful of the seeds with their allowance of Indian corn. Probably no plant yields a larger proportion of oil, which Dr. Cooper, of Philadelphia, has pronounced equal to the finest. But it is worthy of cultivation in the Middle and Northern States, principally as a medicinal plant. A gentleman in Virginia has given the following account of its virtues: "It requires to be sown early in April, at a distance of about a foot apart. A few leaves of the plant, when green, plunged a few times in a tumbler of water, make it quite a thin jelly, without taste or color, which children afflicted with the summer complaint will drink freely, and it is said to be the best remedy ever discovered. It has been supposed that the lives of three hundred children were saved by it last summer in Baltimore, and I know the efficacy of it by experience in my own family."

This plant will throw out a great profusion of leaves by breaking off the top when it is about half grown.

BORAGE.

(Borago officinalis.)

The young leaves of this annual, which smell somewhat like a cucumber, are sometimes used in salad or boiled as spinach. For spring and summer sowing, any light soil and open situation may be allotted, provided the former be not particularly rich. The plants intended to stand the winter in a Northern climate will do best in a light, dry soil, near the southern shelter of a fence.

The seed may be sown at the period of the flowering of the peach for summer use, and in August and September for autumn or winter, in shallow drills a foot asunder. When of about six weeks' growth, the spring plants are to be thinned to twelve inches apart, transplanting those which are lifted at a similar distance. At the time of transplanting, if at all dry weather, they must be watered until established. Water must also be frequently applied, if necessary, to the seed-bed of the summer and autumn sowing.

BORECOLE, OR KALE.

(Brassica oleracea fimbriata.)

"Borecole," or "Kale," is the general term for that class of the cabbage tribe which do not head, but are used for greens in their open growth. They stand the winters at the South without any protection. Sow in a seed-bed about the middle of spring, and when of suitable size transplant to eighteen or twenty inches apart each way, and cultivate like cabbages.

Green Curled Scotch is the kind most generally cultivated. It is very hardy, and, like the Savoys, improved upon by a moderate frost. The stems rise about two feet, and produce an abundance of dark-green curled and wrinkled leaves.

Dwarf Curled Kale, or German Greens.—This variety is more dwarfy; leaves yellowish green, very finely fringed. It makes excellent winter and spring greens, when set out in a light cellar, or otherwise protected from the severity of the weather. In the South, however, and even in warm soils and exposures in the Middle States, borecole will stand the winter in open beds without any protection.

When used, the crown or centre of the plant is cut off, so as to include the leaves, which usually do not exceed nine inches in length. It boils well, and is most tender, sweet, and delicate, provided it has been duly exposed to frost.

BROCCOLI.

(Brassica oleracea botrytis.)

Broccoli is very nearly allied to the cauliflower, and is generally considered a variety of that delicious vegetable. It is hardy, and more sure to head, but inferior to it in flavor. Sow thinly in a seed-bed, about the middle of spring, and transplant and cultivate according to the directions for winter cabbages, burying the seeds not more than half an inch. The plants in the seed-bed are very apt to run up tall and slender, unless they are kept thinned, and free from weeds. When they begin to flower, break the large leaves over the heads to protect them from

the sun, and gather them before they commence running up to seed. Those crops which have to stand the winter in the open air will be greatly benefited by the application of common salt, at the rate of ten bushels to the acre. It should be sown in autumn over the bed in a dry day.

Early Purple Cape.—This is the best variety for the climate at the North. It produces large, close heads of a brownish purple color, and excellent flavor.

White Cape, being a later sort, should be sown very early in the spring. The heads, when in perfection, are large, white, and compact, and so nearly resemble the cauliflower, that it is sometimes called "Cauliflower Broccoli."

Early Purple and Early White are cultivated a good deal at the South, where they will stand out in the open ground and continue to head through the winter.

BRUSSELS SPROUTS.

(Brassica oleracea bullata.)

This variety of the cabbage is but little cultivated in this country. It rises two or three feet high, and produces from the sides of the stalk numerous little sprouts resembling cabbages, one or two inches in diameter. The leaves, which look like the Savoy, should be broken down in the fall to give the little cabbages room to grow. They are used for fall and winter greens, and being quite hardy, should be sown and treated like Scotch kale.

BURNET.

(Poterium sanguisorba.)

The leaves of this perennial, which taste and smell like cucumbers, when bruised, are used in the composition of salads and soups. It delights in a dry, unshaded, and indifferent soil, abounding in calcareous matter, with the addition only of a dressing of bricklayer's rubbish or fragments of chalk. A small bed will be sufficient for the supply of a family.

This plant may be propagated either by seeds or by slips and partings of the roots. The seeds may be sown from the blossoming of the red-flowered maple to that of the apple, if the weather is sufficiently open; but the best time is in autumn, as soon as it is ripe. It may be thinly sown in drills, six inches apart, and not more than half an inch deep. Keep the plants clear of weeds; and when two or three inches high, thin to six inches apart. If propagated by partings of the roots, the best time is in September and October. They are planted at once where they are to remain, and only require occasional watering until established.

CABBAGE

(Brassica oleracea.)

The cabbage is one of the most important vegetables, and in some of its varieties is universally cultivated. Many of the names in the catalogues of different seedsmen are synonymous, but there are only a few well-known standard sorts which have a distinct character, that can be described.

Early York.—This is one of the earliest and most valuable of the early varieties, and justly stands at the head of the list. Heads small, rather heart-shaped, firm, very tender, and excellent flavored. The true Early York is of very dwarf growth, with close heads, and may be transplanted fifteen or eighteen inches apart.

Early Wakefield.—An English variety, of the same shape and about as early as the Early York, and nearly as large as the Oxheart. It is a favorite with market gardeners.

Large French Oxheart.—A most excellent variety from France, which is taking the place of many others, to come in after the Early York. It grows low on the stump, and heads very close and firm, with but few loose leaves; color, yellowish green. There is a sub-variety of this which is smaller, and nearly as early as the Early York.

Large York is larger and two weeks later than the Early York. It endures the heat well, and on that account is much esteemed at the South.

Early Sugarloaf has conical heads, with spoon-shaped leaves; color, bluish green. The heads are not so close and firm as the Large York, nor will it stand the heat so well. It does very well in this climate, but loses its flavor and tenderness late in the season.

Early Drumhead or Battersea.—This is a round, flat-headed variety, of excellent quality. It is one of the latest among the early sorts.

Pomeranian.—A singular variety known in Europe, but not yet much introduced into the catalogues of American seedsmen. Heads uniformly conical, and very solid, even to the extremities of the leaves, which often unite at the top in a twisted form; color, yellowish green.

Large Late Drumhead.—This is a large fall and winter variety, with broad, flat, or round heads; very compact, and of a lightish green color. There are so many cabbages by this name, that it is impossible to describe its exact appearance. It is not uniform among the different seed-growers, but whoever possesses a large late kind that will uniformly head well, of a round or flat form, short stump, tender, and good flavored, has a cabbage with all the good qualities of this variety.

Premium Flat Dutch.—A superb large low-growing cabbage, with heads broad and flat at top, very close and hard, with but few outside leaves; color bluish green, turning to a purplish tint after being touched with frost. It is a fall and winter variety, tender, and one of the very best to keep. With good cultivation on moist rich ground, ninety-five in a hundred will head up hard and fine. Sow 10th of May in New England.

Large Flat Dutch or Late Battersea is an English variety, cultivated for an autumn crop. It so nearly resembles the English Drumhead in growth and quality, that the two kinds are easily confounded.

Large Bergen or Great American is one of the largest and latest sorts, of a lightish green color, with a short stem. The heads are large, firm, and rather sound; very tender, and most excellent flavored. It is a good kind for market and family use. Plants that have not closed when the crop is gathered in the fall, will frequently head during winter. if they are set out in a cellar. It is an American variety, and keeps well.

Green Glazed is a coarse, loose-headed cabbage, cultivated a good deal at the South, because it is thought to withstand the attacks of the

cabbage-worm better than any other variety; color dark, shining green.

Green Globe or Curled Savoy does not make a firm head, but the whole of it, being very tender and pleasant-flavored, is used for cooking; leaves dark green, and wrinkled. This and the next are very hardy, and improved by frost.

Drumhead Savoy grows to a large size; heads nearly round, or flattened like the Drumhead, and quite firm; sometimes heart-shaped; very tender and excellent for winter. The Savoys approach nearer to the delicious richness of the cauliflower than any of the other cabbages. Sow early.

Red Dutch or Pickling.—This is an esteemed sort for pickling. It is also shredded, and eaten raw in vinegar. It grows about medium size, and forms very hard, oblong heads, round at top, and, when pure, of a dark red or purple color. Sow early, and set out twenty-eight inches by two feet apart.

Couve Tronchuda.—A variety of cabbage from Portugal, which does not head, but produces very large and tender leaf-stalks. When cooked like sea-kale, it is esteemed by many as a delicious vegetable. Cultivate the same as cabbage.

For cabbages, the ground must be highly manured, deeply dug, or ploughed, and thoroughly worked, to insure good, full-sized heads. A heavy, moist, and fresh loam is the most suitable. The early sorts are sometimes sown early in autumn, and protected in cold-frames through the winter, and transplanted early in spring; but more generally at the North they are sown very early in the spring, in hot-beds, or later in the open ground. In the mild climate of the Southern States, where they will stand the winter, they are planted out in the fall. Eighteen inches by two feet apart is the common distance.

The late, autumn, and winter varieties may be sown in a seed-bed, from the middle to latter end of spring, and transplanted, when about six inches high, to twenty-eight inches apart, each way. Shade and water the late sowings in dry weather, to get them up. It is important that the plants should stand thinly in the seed-bed, or they will run up weak and slender, and be likely to make long stumps. If they come up too thick, prick them out into beds four to six inches apart, which will cause them to grow low and stocky. Treated in this manner, the plants will form lateral roots, and they can be removed, with the earth attached, in a moist day, without checking their growth. When the weather is hot and dry, the roots of the plants should be dipped in a puddle of loam and water, and transplanted just at evening, giving each plant a gill of water at the root. Cabbages should be hoed every week, and the ground stirred deeper as they advance in growth, drawing up a little earth to the plants each time, until they begin to head, when they should be fairly dug between, and hilled up. After they are partly headed, it is the practice of some gardeners to lay them over on one side. It is thought by some that they do not head much better for it, though they certainly have done quite as well. Loosening the roots will sometimes retard the bursting of full-grown heads.

"Clump-root" is a disease of the cabbage tribe, affecting the roots, which become distorted, knobby, and monstrously swollen. It is caused

by the larva of a little weevil, and prevails mostly in old gardens. It is attributed to the too frequent repetition of cabbages on the same ground, to the character of the manure, and dry weather. Old dry manure, particularly hog-dung, full of insects, is most likely to produce the disorder. It sometimes does not show itself till the plants are half grown, when there is no remedy. It is indicated by the leaves wilting and flagging in sunny weather. The disorder is not constitutional, but affects broccoli, cauliflower, and all kinds of cabbage, in the same ground. It is avoided by a rotation of crops, change of manure, and deep tillage, turning up to the surface a good portion of the sub-soil.

To avoid the black fly, sow in boxes of earth, raised two feet above the ground, which must be kept watered. The plants will be perfectly secure from attack.

To preserve cabbages during winter, pull them in a dry day, and turn them over on the heads a few hours, to drain. Set them out in a cool cellar, or bury them, with the heads downwards, in long trenches, in a dry situation. In the Middle States, bury the stump and part of the head in the open ground, and place over them a light covering of straw and boards in severe weather. On the sea-coast, in the Eastern States, cabbages are effectually protected by a covering of sea-weed.

Cabbage-plants, before heading, are used extensively at the South for greens, under the name of "Collards." Any of the early sorts answer well for this purpose, particularly the Early Sugarloaf. Sow from early in spring to summer, and thin or transplant to a foot apart. Rape is grown for the same purpose.

CARAWAY.

(*Carum carui.*)

Caraway is a biennial plant, a native of England, with spreading branches, growing to a height of a foot and a half. It is chiefly cultivated for the seed, which is used in confectionary and in medicine. When young and tender, the under leaves are sometimes used in soups.

This plant is raised from seed, of which a quarter of an ounce is sufficient for a seed-bed containing twenty square feet. The best time for sowing is in autumn, soon after the seed is ripe; but it may be sown at the period of the flowering of the almond or peach. The seedlings, which will rise quickly, may be thinned out to a foot apart each way.

CARDOON.

(*Cynara cardunculus.*)

The cardoon is a perennial resembling the artichoke, but grows to a greater height. The stalks of the inner leaves, when rendered tender by blanching, are used in stews, salads, and soups.

The seed may be sown at the period of the flowering of the apple. For a late crop, it may be performed a month later. The best practice is to sow in patches in rows four feet apart, and three, four, or six inches along the rows, or they may be sown broadcast in a seed-bed, to be transplanted in about eight or ten weeks. The seed may be covered about half an inch deep. When the plants are a month old,

they may be thinned out to four inches apart, and those removed may be pricked out to a similar distance. When of the age sufficient for removal, they may be carefully taken up, and the long straggling leaves pinched off. The bed for the reception must be well dug, and laid out in trenches as for celery, or in a hollow, sunk for each plant. At the time of planting, and subsequently, water must be abundantly applied until the plants are established; and also through the summer, if dry weather occurs, regularly every other night, as this is found to prevent their running to seed. When advanced to about eighteen inches in height, the leaves must be tied together in a dry day by a hay or straw band, and then earthed up like celery. As the plants grow, use more hay bands and more earthing, until blanched. In the Middle States, the plants may remain in the ground during the winter, provided they are covered with litter or straw.

CARROT.

(Daucus carota.)

The carrot is an important vegetable in general cultivation. It succeeds best on a light, sandy loam, made rich by manuring the previous year. In fresh-manured land, the roots often grow pronged and ill-shaped. If it is to be sown late in the spring, soak the seed a day or two in warm water, and mix it with plaster or ashes. It will then come up, in fresh prepared ground, before the weeds, and the first weeding may be done with but little labor.

Early Horn.—This is the earliest variety. It is shorter than most of the other sorts, and the tap-root terminates abruptly, giving it a blunt appearance; color, deep orange; fine-grained, and agreeable flavored; top small. It is the best for the table, and will grow very well on thin soil. Sow six inches apart, in fourteen-inch drills.

Long Orange.—The standard sort; roots long, smooth, and deep orange-color; suitable for the table, and for the main field crop. It requires a good deep soil, and to stand eight inches apart, in eighteen-inch drills, to grow to large size.

Altringham.—Differs from the Long Orange only in growing a little out of ground, with a green top.

Large White Belgian.—Grows one-third out of the ground; roots pure white, green above ground, with small tops. It is much grown by the French for soups and seasonings. It will grow to a large size on light, rich soils, and is very easily gathered. Though it has been recommended for farm cultivation, it is not so nutritious as the deeper-colored carrots, and does not keep so well.

Large Lemon.—This variety grows to a larger size at the top than any of the others, but not over two-thirds the length of the Long Orange. Color, light lemon; very productive, and easily gathered; suitable for feeding only.

Blood Red or Purple.—Roots, medium size; color, dark purple; fine-grained, and sweet. It is much esteemed for table use among the French people, at the South and in the West Indies.

To preserve carrots during the winter, they should be dug in a dry time, when the roots will come up clean. Let them lie a day in the

sun to dry and wilt a little, and deposit them in small heaps in a cool cellar, secure from frost. They should be examined often, and overhauled, if they begin to sweat. Carrots are very apt to heat when packed away in a large body. They have been kept perfectly well, packed in dryish sand, in long, narrow trenches, below frost. In the same way, again, they have nearly all been lost. The main object is to keep them from the wet.

CAULIFLOWER.

(Brassica oleracea cauliflora.)

This is a delicate vegetable, of the cabbage tribe, with long, pale-green leaves, and a close, curdy head, formed of the flower-buds before they shoot up to seed.

Early London.—The earliest and best suited for sowing in the fall.

Large Late Asiatic.—Large and taller than the above, and a finer sort for spring sowing.

Walcheren.—An excellent variety, producing close, compact heads, and may be sown both in spring and fall. It is sometimes called "Walcheren Broccoli."

For the spring or summer crop, sow the early kind, at the North, about the middle of September, and when two inches high, transplant them, three inches apart, into a frame, covered with glazed shutters, where they must be protected through the winter; in the spring, transplant to two and a half feet apart. For the late autumn crop, sow the late kind middle of the spring, and transplant like winter cabbages. In dry weather, water freely, and, as they advance in growth, hoe deep, and draw earth to the stems. After they begin to head, they should be watered every other day. On the approach of frost, those plants which have not headed may be set out in a cellar, where they can be aired in mild weather. In two or three weeks, the strongest will begin to form flower-heads, which will be very tender and delicious.

CELERIAC, OR TURNIP-ROOTED CELERY.

(Apium graveolens rapaceum.)

The root of this plant, when properly cultivated, is tender and marrow-like, having a sweeter taste and stronger odor than those of other celery. It is principally used for seasoning meats and entering into the composition of soups. The soil in which it is cultivated should be deep, rich, and well worked. The seed may be sown at the flowering of our orchard fruits, in drills six inches apart, kept regularly watered every evening, should the weather prove dry. The bed must be kept free from weeds, and when the plants are about three inches high, they may be pricked out in rows three inches apart each way, giving abundant and frequent waterings. By adopting the precautions mentioned in the cultivation of celery, the same seed-bed will afford two or three distinct prickings. When the plants are five or six inches high, they are fit for removal to level ground, where they are to remain, and in drills two feet asunder, and eight inches apart along the drills. The only after-culture required is to earth them up to a height of about three inches, watering them plentifully at least every other evening, if the weather be dry, and keep them free from weeds.

CELERY.

(Apium graveolens.)

Celery is a hardy biennial, native of Britain, and known in a wild state by the name of "Smallage." When cultivated and properly blanched, the stalk is sweet, mild, and crispy, being very palatable either in a raw or cooked state. There are several varieties in cultivation. The best are the following:

White Solid is the variety most commonly grown; clear white, solid and crisp.

Red Manchester or Rose-colored Solid grows to larger size than the above, and is considered more hardy; stalks delicate rose-color when blanched.

New Silver Giant or Law's Giant.—This is esteemed the best in cultivation. It grows to a large size; stalks white, round, very crisp, and perfectly solid.

Seymour's Superb White.—The difference between this and the Silver Giant can scarcely be perceived. It is not more vigorous in growth, nor any more solid or better flavored.

Cole's Superb Red.—Very compact, large, and solid; of superior quality, and crisp. One of the best red varieties.

To have celery early, it should be sown in a hot-bed quite early in the spring, and when three inches high, planted out in a well-prepared bed, which must be covered with boards or mats in frosty weather.

For the principal crop, sow early in the spring, very shallow, in a seed-bed, which should be beaten lightly with the back of a spade, to settle the earth about the seeds. When the plants are of the above named size, thin or prick them out to four inches apart; and when about six inches high, transplant them six inches apart into trenches for blanching. Dig the trenches four feet apart, a foot wide, and ten inches deep. Fill in five or six inches of well-rotted manure, and mix it thoroughly half a spade deep with the earth at the bottom. The tops and roots of the plants should be shortened, and the suckers pinched off before they are set. Earth up to blanch two or three times during their growth, holding the leaves close with the hand while the earth is drawn up, taking care that none of it falls into the centre of the plants. A slight sprinkling of salt applied to the surface of the soil just before earthing up, is decidedly beneficial to this crop. Celery, like asparagus, is wonderfully improved by superior culture.

CHAMOMILE.

(Anthemis nobilis.)

This annual is cultivated on account of its flower, which is much used in medicine, and is administered under the name of chamomile tea. A double-flowered variety, though more beautiful than the single-flowered, is less useful. A double sort, however, is most cultivated.

This herb delights in a poor sandy soil. Either kind may be propagated by partings of the roots, or by slips of the rooted offsets, or of the runners. Let them be detached with roots, in little tufty sets, at the periods of the flowering of our orchard fruits, and plant them from eight to twelve inches apart; giving them water as may be necessary.

The flowers should be gathered in their prime, just when full blown. Let them be spread to dry in a shady place; then put them into paper bags, and house them for use.

CHERVIL.

(Chærophyllum sativum.)

This is a warm, aromatic annual. It is cultivated and employed like parsley, for the leaves, which are used in salads and soups. Sow at any time in the spring, in shallow drills, a foot apart, and compress the ground with the back of a spade.

CHICORY, OR SUCCORY.

(Cichorium intybus.)

This plant is cultivated for use in salads, and for its roots to roast for mixing with coffee.

Like endive, for the main crop, it requires a rich, light soil; and for the earlier sowings a moister one, having, in every instance, an open situation. Although a perennial, it must be sown annually, as, after being cut from two to three times, the leaves become bitter and worthless. The periods of sowing may correspond with those of the flowering of our orchard fruits. Sow moderately thick, in the same manner as endive. When the plants begin to cover the ground, thin to nine inches apart; and those removed, plant out at similar distances. If the leaves grow very luxuriant and shade the roots much, they must be cut off within an inch of the ground. In about four months after the sowing, let the leaves of the plant be trimmed away so as not to injure their hearts, and then cover over thick with long litter, ashes, or sand. By this treatment, those fresh leaves which are produced become blanched and crisp, and lose their bitterness. Water must be given moderately in dry weather during the season. If the roots are vigorous, they will bear cutting two or three times, after which they are unproductive.

A variety, which the French call *chicorée sauvage à café*, has long fleshy roots like the white carrot, which are used for making coffee. In the Middle and Southern States, the roots may remain in the ground during winter without injury from frost.

CHIVE, OR CIVE.

(Allium schœnoprasum.)

This is a hardy perennial plant, a native of Britain, the awl-shaped leaves of which rise from numerous small bulbous roots connected in bunches. They are used as a superior substitute for young onions in spring salads. A single row a few yards long will supply a family.

This plant flourishes best in a light rich soil. It may be propagated by planting eight or ten offsets of the bulb in spring in rows ten inches apart, or in irregular patches containing as many offsets. By autumn, they multiply into large-sized bunches; and, if required, may be taken up as soon as the leaves decay, and stored as a substitute for the onion. The leaves, which are fit for use as long as they remain green, may be

cut down close to the ground as they are wanted, when they will speedily be succeeded by others.

CHUFAS, OR EARTH ALMONDS.

(Cyperus esculentus.)

This perennial is indigenous to the southern parts of Europe, growing in the form of a rush to the height of about three feet, producing small tubers about the size of an ordinary bean, and are known by the Valencians by the name of "chufas." The tubers resemble in taste a delicious chestnut or coco-nut, and, like them, may be eaten raw or cooked. After soaking in water twelve hours, they are eaten as a sauce. They are chiefly employed in Spain for making an orgeat, (orchata de chufas,) a delightful, refreshing drink, much used in Madrid, Valencia, Cuba, and other hot climates where it is known.

In the Middle States, it may be planted in June or July, in bunches, two feet apart each way, ten or twelve tubers in each, about six inches asunder. As soon as the first shoots begin to appear, the ground should be watered, and repeated every ten days, should there be no rain. No cultivation is necessary, except carefully to eradicate the weeds. It will continue to grow until September, when it puts forth its flowers. These, however, may be pinched off, in order that the tubers may grow to a larger size, which will arrive at maturity in October, when they may be dug out of the ground and stored away. In drying, they lose about one-third of their weight.

CLARY.

(Salvia sclarea.)

This biennial is a native of Italy and Syria. Its leaves are sometimes used in soups and medicated wines. A very small number of plants is sufficient for a family.

The seed may be sown annually, at the period of the flowering of our orchard fruits; but if early, in any light-soiled border. Thin out the plants at two feet apart each way.

COLZA, OR RAPE.

(Brassica napus.)

This plant, like mustard and other small salading, may be sown at any period of the year when in request, being allowed a separate bed. It is cultivated as mustard.

CORIANDER.

(Coriandrum sativum.)

This annual has long been cultivated for its seeds, which have a pleasant flavor, and when encrusted with sugar are sold by the confectioners under the name of "coriander comfits." They are also used in bitter infusions and preparations of senna, the disagreeable taste of which they completely overcome.

This plant succeeds the best in a sandy loam. The seeds may be sown at the period of the flowering of the peach, in drills nine inches apart.

CORN SALAD.

(Fedia olitoria.)

"Corn Salad," "Fetticus," or "Lamb Lettuce," is an annual, a native of Europe, and is cultivated as a winter and spring salad. The seeds are sown in September, thickly, in shallow drills, one-fourth of an inch deep. If the weather be dry, the ground should be compressed with the feet or the back of a spade. It requires no other culture, except to keep the ground clear of weeds. In a high northern climate, it requires protection during the winter, with a slight covering of straw. If the soil is good and rich, the flavor of the plant will be greatly improved.

CRESS, OR PEPPERGRASS.

(Lepidium sativum.)

The "Curled" variety of cress is too well known to need any description. The "Broad Leaved" varies from it only in the leaf, which is large and broad. Sow thickly, in shallow drills, every two weeks throughout the season. Give occasional waterings in dry weather.

"Winter Cress," sometimes, but erroneously, called "Water Cress," is entirely different from the preceding. It is a much larger plant, hardy, and more pungent.

WATER-CRESS.

(Sisymbrium nasturtium.)

The true water-cress is an aquatic plant, with small oval leaves, and prostrate habit. The leaves are universally used and eaten as an early and wholesome salad in spring.

The plant is cultivated by sowing the seeds by the side of running water near springs, which are not severely frozen in winter. Transplanting, however, is always surer than sowing, and is therefore preferred. This ordinarily may be done from March till August. The distance between the plants should not generally be less than ten or fifteen inches. Stirring the earth about the roots from time to time is useful; but, having once taken root, no further care is necessary. A cress plantation is in full bearing the second year, and lasts a long time. When it begins to fail, it may be renewed by taking a foot of the surface-soil off the old bed, and replacing it with good, fresh earth. In winter, the beds may be covered more deeply with water, which will protect the plants against the frost.

CUCUMBER.

(Cucumis sativa.)

Cucumbers are cultivated in all vegetable gardens, and are highly esteemed in warm weather for their cooling and refreshing qualities and for pickling.

Early Russian.—This variety has recently been introduced from Europe. It promises to be a valuable acquisition on account of its extreme earliness and prolific character, producing cucumbers for the table at least ten days earlier than the Early Cluster, which it resem-

bles in growth, but is much smaller and shorter, being only about three inches long when fit for use. It sets in pairs, and the first blossoms usually produce fruit. Flavor, pleasant and agreeable. It makes very small pickles.

Early Cluster.—A short, prickly, seedy variety, bearing in clusters near the root. It is a great bearer, and comes to maturity the earliest in the list, excepting the Early Russian.

Early Frame.—The standard sort for the table and for pickling; of medium size, straight and handsome. It makes a beautiful pickle that keeps well.

Short Green is very similar, and in many catalogues it is the same as the Early Frame.

Early White Spined.—The best sort for the table. It is a little larger than the Early Frame, and grows uniformly straight and smooth; dark green, with white prickles; tender and excellent flavored. The fruit, in turning white at maturity, retains its fresh appearance much longer than any of the yellow varieties; on this account, it is a favorite with marketmen. A good kind for forcing, and a great bearer. "New York Market" is another name for it.

London Long Green.—A very excellent variety, about a foot in length, rather pointed at both ends, dark green, firm and crisp. It is a fine kind for the table, and makes a beautiful pickle for those who like them hard and brittle. A good bearer.

Extra Long Green Turkey.—One of the longest varieties, growing to a foot and a half or more in length; dark green, and very solid, producing but few seeds. A very fine and productive cucumber.

Gherkin or West India.—A very small, oval-shaped, prickly variety, having more the appearance of a burr than a cucumber. It is quite late, full of seeds, and, when pickled, a perfect sponge. The seeds are slow to vegetate. This differs from the "gherkin" of the North.

Cucumbers for early use may be planted in the open ground as soon as the weather becomes settled and warm, in hills four feet apart, enriched with a shovelful of warm manure or well rotted compost in each hill. Tread the manure and cover it with an inch or two of earth, and scatter eight or ten seeds to a hill; cover half an inch deep with fine earth and beat it down with a hoe. Hoe frequently to keep them growing, and when out of danger from insects, thin the plants to four in a hill. Hog-dung and ashes mixed in the hill is the very best manure for cucumbers, for the principal or late planting. From the middle of June to the first of July is the right time in New England to plant for pickling.

To obtain early cucumbers with the aid of a hot-bed, take blocks of turf six inches square, and place them grass-side down, in the bed, early in the spring; plant the seeds on them, and when of suitable size, and the weather mild, they may be removed to the open ground, where they must be protected with a hand-glass, or muslin-covered box, over each hill, whenever the air is cold and raw.

Market gardeners who desire to obtain the earliest crop to be had in the open ground, after manuring the hills, mark them across at right angles, and plant each quarter every week, so that if one planting fails,

another immediately follows. By this management, they are sure to be among the first in market with the out-door crop.

Cucumber, as well as melon and squash seeds, are considered best when two or three years old; they run less to vines, and bear earlier and more abundantly.

DILL.

(Anethum graveolens.)

This biennial grows wild among the wheat fields in Portugal and Spain, and may be cultivated in the Middle and Southern States, where the soil is rather dry. Its leaves and umbels are used in pickling, and the former in sauces and soups. The seeds are also sometimes put into pickles, particularly cucumbers, to heighten the flavor.

The seeds should be sown as soon as they are ripe; for, if kept until spring, they are often incapable of germinating. They may be sown in drills a foot apart, the plants to remain where sown. When of three or four weeks' growth, thin them out to about ten inches apart. The leaves are fit for gathering as wanted. The umbels are open in July or August.

EGG-PLANT.

(Solanum melongena.)

The egg-plant is a very tender vegetable, requiring a hot-bed to bring it to perfection in the Northern States. At the South, it is sometimes called "Guinea Squash."

Early Long Purple.—The earliest and most productive. Fruit long, and of superior quality.

Large Oval Purple.—This variety is more generally cultivated. It grows to a large size, oval shape, and dark purple color. There is a prickly and a smooth-stemmed sort. The "Prickly" grows the largest, and the "Smooth-stemmed" is the earliest.

Sow in hot-beds very early in the spring, and transplant to two and a half feet apart each way, in very rich, warm ground. Draw earth to the plants as they advance. For the want of a hot-bed, the seeds may be sown in window-pots early in the spring; or later, on a warm, light bed, made in a sheltered part of the garden.

ELECAMPANE.

(Inula helenium.)

A tall, perennial, rough-looking plant, native of Britain, growing in moist, shaded situations. The roots are carrot-shaped, which, when dried, ground, and made into tea, is regarded in domestic medicine as an excellent remedy for a cold. This plant also furnishes the *Vin d'Aulnée* of the French. It may be propagated from seeds, or by divisions of the roots.

ENDIVE.

(Cichorium endiva.)

This is a hardy annual, cultivated principally for a winter salad. It is also used in stews and as a garnish for the table. Sow from late in the spring to the middle of summer, in shallow drills fourteen inches

apart; thin the plants to one foot in the drills, and when fully grown, tie over the outer leaves of a few of them every week or fortnight, in dry weather, to blanch, which takes from one to three weeks. Draw up a little earth to the base of the plants. Rich, mellow soil, in an open situation, is most suitable.

Green Curled is the hardiest variety, with beautifully curled, dark-green leaves, very crisp and tender. It is the most cultivated in this country for salads, and is considered a very wholesome vegetable.

White Curled resembles the green, except in color and hardiness, being more tender; not much grown.

Broad-leaved Batavian.—This is the "Scarole" of the French, and is principally used in soups and stews. Leaves broad, light green, and nearly plain.

FENNEL.

(Anethum fœniculum.)

Fennel is a perennial plant, the tender stalks of which are employed in salads; the leaves, when boiled, enter into the component parts of fish sauce, and are used as garnishes for several dishes in a raw state. The blanched stalks of the variety called "Finochio" are eaten with oil, pepper, and vinegar, as a cold salad; and they are likewise sometimes used in flavoring soups.

This plant, in a dry soil, is the longest-lived. It may be propagated by offsets, partings of the roots, and by seed, any time in the spring previous to the period of the flowering of the apple or pear. The best season, however, for sowing is in autumn, soon after the ripening of the seed, at which time it may also be transplanted from six to twelve inches asunder. If the weather be dry, water must be freely given at the time of the removal until the plants are well established. The stalks of those which are not required to produce seed must be cut down in summer as often as they run up. If this is strictly attended to, the roots will last for many years.

GARLIC.

(Allium sativum.)

This well-known perennial, so much used in seasoning meats and soups, grows best in a light, rich soil. It is generally propagated by parting the roots, but may be raised from the bulbs produced on the stems. It may be planted in the spring at any time previous to the flowering of the cherry or the peach, provided the ground is sufficiently open and dry. A single "clove" is planted one inch deep in each hole, made in drills six inches apart, and also six inches asunder along the drills, care being taken to set the root-end downwards. To do this, it is the best practice to thrust the finger and thumb, holding a clove between them, to the requisite depth, without any previous hole being made. Keep the plants frequently hoed until June or July, when the leaves are to be tied in knots to prevent the plants from running to seed. The roots intended for future use should not be lifted before the leaves wither at the close of July, or in the course of August.

It is usual to leave a part of the stalks attached, by which they are tied into bunches, being previously well dried, for keeping during winter and spring.

GINGER.

(Zingiber officinale.)

This perennial, so well known in domestic economy, may be easily cultivated at the South by divisions of the green roots, and will grow equally well in the Northern and Middle States in the months in which no frost occurs. In the latter, the roots should be planted either in a hot-house or under frames, and removed for open culture as soon as the season will admit. The slips may be planted at the distance of two and a half feet each way, and it is only required to keep the soil frequently stirred, and free from weeds. Experience shows that in situations where ginger is extensively grown, when the stalks are fully withered, the roots are best fitted for use, and should be taken up. Those, however, which are intended for planting, may be lifted earlier, if necessary, to protect them from injury by frost. In the Middle States, and some portion of the Southern, it is probable that they might remain in the ground until early spring by covering them with litter or straw.

HOREHOUND.

(Marrubium vulgare.)

This annual may readily be raised from seeds by sowing them during the spring months, in any hot, dry, or dusty situation. Its uses in domestic medicine are too well known to be described here.

HORSE-RADISH.

(Cochlearia armoracia.)

Horse-radish, so well known in medicine, as well as a condiment in the form of salads or sauces, delights in a deep, rich soil, and may be grown in any part of the United States. Should the ground require manure, it should be dug in at the depth to which the roots are intended to run—say, from two to three feet. It is propagated by sets, provided by cutting the main root and offsets into lengths of two inches. The tops or crowns of the roots form the best; those taken from the centre never becoming so soon fit for use, nor of so fine a growth. Each set should have at least two eyes; for without one eye, they refuse to vegetate at all. For a supply of the crowns, any inferior piece of ground, planted with sets six inches apart, and six inches deep, will furnish from one to five tops each, and may be collected for several successive years with little more trouble than keeping them clear of weeds. The times for planting are from October till May. The sets may be inserted in rows eighteen inches apart each way, and covered to the depth of an inch. The shoots, after they make their appearance, require no other cultivation than keeping the ground well stirred and free from weeds. As the leaves decay in autumn, they should be removed, and the ground hoed and raked over, which may be repeated the following spring. In the autumn of the second year, they merely require to be hoed again as before, and the roots taken up as wanted for use. By

having three beds devoted to this plant, one will always be lying fallow and improving.

In taking up the roots, a trench is dug along the outside row quite down to their bottoms, which, when the bed is continued in one place, may be cut off level to the original stool, and the earth from the next row then turned over them to the requisite depth; and so on in rotation to the end of the bed. By this mode, a bed will continue in perfection for five or six years; after which, a fresh plantation is usually necessary. But, after all, perhaps, the best practice is to take the crop up entirely, and to form the plantation annually; for it not only causes the roots to be finer, but also affords the opportunity of changing the site. If this mode be adopted, care must be taken to raise every lateral root, for almost the smallest will vegetate if left in the ground.

HOP.

(Humulus lupulus.)

The hop is a perennial plant of easy cultivation, and will grow in any part of the Union. Its domestic uses are so obvious that no farm or garden should be without one or more roots. It requires a very rich, deep, mellow soil, with a dry, porous or rocky sub-soil. The exposure in a northern climate should be towards the south, as on the slope of a hill, or in any well-sheltered valley. It may be propagated from seeds, or by divisions of the roots; but it is more usual to plant the young shoots which rise from the bottom of the stems of old plants. These are laid down in the earth till they strike, when they are cut off and planted in a nursery bed. Care must be taken to have only one sort of hops in the same plot or field, in order that they may all ripen at the same time.

The ground having been prepared for planting, it is divided by parallel lines, six feet apart, and short sticks are inserted into the ground along the lines at seven feet distance from each other, and so as to alternate in the rows, as is frequently done with fruit trees and other plants, in what is called the "quincunx form." By this method, every plant will be just seven feet from each of its neighbors, although the rows will be only six feet apart, and consequently about one-eighth of ground will actually be saved, as indicated in the diagram below:

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At each stick a hole may be dug two feet square and two feet deep, and lightly filled with the earth dug out, mixed with a compost prepared with well-rotted dung, lime, and muck. Fresh dung should never be applied to hops. Three plants are next placed in the middle of this hole six inches asunder, forming an equilateral triangle. A watering with liquid manure will greatly assist their taking root, and they soon will begin to show "bines." A stick three or four feet long is then stuck in the middle of the three plants, and the bines are tied to these with twine or bast, till they lay hold and twine round them. During their growth, the ground should

be well hoed, and forked up around the roots, and some of the fine mould thrown around the stems. In favorable seasons, a few hops may be picked from these young plants in autumn, but in general. there is nothing the first year. Late in autumn, the ground may be carefully dug with a spade, and the earth turned towards the plants to remain during the winter. Early in spring, the second year, the hillocks around the plants should be opened, and the roots examined. The last year's shoots are then cut off within an inch of the main stem, and all the suckers quite close to it. The latter form an agreeable vegetable for the table, when dressed like asparagus. The earth is next pressed round the roots, and the cut parts covered so as to exclude the air. A pole about twelve feet long is then firmly stuck into the ground near the plants; to this, the bines are led and tied as they shoot, till they have taken hold of it. If, by accident, a bine leaves the pole, it should be carefully brought back to it, and tied until it takes new hold.

HYSSOP.

(Hyssopus officinalis.)

A hardy, blue-flowered, perennial evergreen, the whole plant having a strong aromatic scent, and the leaves and flowers a warm, pungent taste. The latter are sometimes reduced to powder, and used in cold salads. Its uses in domestic medicine are well known. The flower-spikes and young leafy shoots are the parts of the plant usually saved, which may be cut as they are wanted for use.

This plant is easily propagated by sowing the seeds in a light dry soil in the spring, or by planting divisions of the roots either in autumn or spring.

The flower-stems may be gathered in summer, dried in the shade, and hung up in a dry place for future use.

INDIAN CORN.

(Zea mays.)

This excellent vegetable is universally grown in this country for boiling in its green state, and when planted at proper intervals, it may be had for the table from early summer until the appearance of hard frosts. Plant in hills, in general, three feet, apart each way for most kinds, and leave four plants to a hill.

Smith's Early White.—This very dwarfy variety is the earliest in the list; cob, white; kernels, eight-rowed, and nearly as white as the Tuscarora. Plant the hills two feet and a half apart.

Early Red-cobbed Sweet.—This is another early variety. The ears are short, ten or twelve-rowed, and filled to the end of the cob. It is fit for boiling a week or ten days before the large eight-rowed sweet.

Large Sweet.—Eight-rowed; cob, white; kernels, very regular, and straight in the rows; ears, long and well filled. The best sort for the main crop.

Mammoth Sweet.—A very large and late variety of sweet corn. Eight-rowed; cob, red, and a foot or more in length, filled completely

over the end. It is very productive in rich ground, and requires a large space. Make the hills three and half feet apart.

Early Tuscarora.—A large variety, with broad flour-white kernels, a little indented; eight-rowed; cob, red; remains a long time in a boiling state. It requires wide planting and very rich soil.

Early White Flint.—Has eight or more rows, with medium-sized ears. The kernels have a transparent, flinty appearance, and are very hard when dry. A valuable kind for field culture.

New Mexican White Flint.—A new variety, recently brought into general cultivation throughout the Atlantic States south of New Hampshire. The ears are large, having eight or more rows with large broad kernels of a flinty appearance on the exterior, but starchy within. Its quality is excellent for table use when green; also for hommony, meal, or for stock. May be cultivated like the Early Tuscarora.

Late Green, sometimes called "Evergreen," a late strong-growing variety, with rather short, thick ears, twelve to eighteen-rowed; kernels rather long, and thickly set on a white cob. This and the Mammoth keep soft longer than any other sort.

Six-weeks Corn, or *Forty-days Maize,* (Maïs quarantain, of the French,) a valuable variety for early use, or for a high northern or mountainous climate, where the season is short. Although it is reputed to have ripened in forty days after planting, high up the Alps, it will not be fit for the table in any part of the United States short of sixty or seventy days.

KOHL-RABI.

(*Brassica caulo-rapa.*)

Kohl-rabi, or "Turnip-stemmed" cabbage, also sometimes called "Cape cabbage," rises in a thick stem about eight inches out of the ground, terminating at the top into a globular form, somewhat like a large Swedish turnip, crowned with leaves slightly scolloped on their edges, undulated, and of a milk-green color. There are several varieties of it, but the "Green-stemmed," and the "Purple-stemmed," especially the latter, are to be preferred.

This vegetable is sweeter, more nutritious, and more solid than either the cabbage or white turnip; produces a greater weight per acre than the latter, and prefers a heavier soil than that root; it also is hardier, and keeps better than any other bulb, and imparts, when fed to cows, but little of that flavor known as "turnipy," either to butter or milk.

The seeds of this plant may be sown at the same period as the Swedish or ruta-baga turnip, and may be cultivated in the same way, remembering to leave the chief part of the stems uncovered by the earth. The bulbs may be kept sound and nutritious until very late in the spring, even later than those of the Swedes.

LAVENDER.

(*Lavendula spica.*)

Lavender is much prized for the very grateful odor of its essential oil. The flowers and leaves have long been used as perfumes; and

the ancient Romans employed them to aromatize their baths, and to give a sweet scent to water in which they washed; hence the generic name, "lavendula."

This plant, like rosemary, may be propagated from seeds, or by slips or cuttings of the roots, which, in a mild climate, are perennial. It thrives best in a dry soil, and may be set either in distinct plants, two feet asunder, or form a sort of hedge-row or border, in one or more lines, especially where large supplies of flowers are required for distilling. The plants will advance in a close branchy growth, and when established will produce an abundance of flowers, which should be gathered while in perfection, cutting the spikes off close to the stem. In a dry, gravelly or poor soil, the flowers have a more powerful odor; while in a rich garden, notwithstanding it may grow strongly, they have less perfume.

LIQUORICE.

(Glycyrrhiza glabra.)

This plant, which is well adapted for the South, is a tender perennial, with roots extending very deep into the ground, and creeping to a considerable distance. When full grown, they are as thick as the thumb, round, slender, flexible, and furnished with a few scattered rootlets; of a yellowish color externally, succulent and fibrous within. From the root proceed three or four erect, herbaceous, pale-green stems, four feet and upward in height, garnished by alternate, pinnated leaves, having yellowish-green leaflets, clammy on their under sides. The flowers are small, papilionaceous, of a bluish or purplish color, and are succeeded by oblong, smooth, compressed, pointed and one-celled legumes, containing two or three small kidney-shaped seeds.

The soil should consist of a moist, loose, sandy loam, or the black mould of the alluvial or bottom lands situated near our Southern lakes and streams. In short, the fresher, newer, and richer the ground, the better for the plantation; and if not sufficiently rich, it should be made so by adding a due quantity of rotten stable-dung, mixed with plaster or charcoal, and wood ashes or lime, in order to rot it the more, till deprived of its fermentative heat, which would otherwise injure the runners, or sets. The ground should be sub-soiled or trenched three or four feet deep, and, if sufficiently rich, thrown into three-and-a-half-foot beds, including the alleys, in the centres of which the sets are to be planted early in March, at intervals of eighteen inches apart; but if the ground is not sufficiently rich, trenches must be dug throughout the field three and a half feet apart, from centre to centre, wide enough, at least, for a man conveniently to work in, and three or four feet deep. When one trench is dug, it must be filled with the earth from the next, well incorporated with the dung or compost, and alleys made seven or eight inches deep midway between the trenches, the earth being spread over them, so as to form raised beds throughout the plantation.

In the next place, the runners, or sets, are to be provided, which consist of those sprouts that proceed from the thick ends of the roots, or crowns, of the plants, usually lying about two inches below the surface, and are three or four feet in length. These small running

roots are to be cut into five or six-inch pieces, with two or three eyes, or joints, to each piece. Another kind of sets consists of the tops, or crown-buds, which are cut from the liquorice roots at the time of harvesting. When the sets are in readiness, dibble holes along the centres of the beds, eighteen inches apart, and seven or eight inches deep, into each of which thrust a piece of root, with the small end downward, covering it entirely with mould. If crown-buds are used, they may be treated in the same manner, with the exception of dibbling the holes less deeply. During the spring and summer, all weeds must be kept down by the hoe, care being taken not to cut off the top shoots of the plant, as it would greatly injure them. In the autumn, when the stems of the liquorice are in a decaying state, they should be cut down, and a light dressing of rotten dung spread upon the surface. The following spring—say early in March—the ground should be slightly dug between the rows, burying the last dressing of dung, care being observed not to cut or otherwise injure the roots. During the second and third summers, the field must also be kept free from weeds by occasional hoeings.

At the end of three years after planting, the roots will be fit to take up. The proper season for this is from November till February; for they should neither be taken up before the stalks are fully decayed, nor deferred till late in the spring; otherwise they will be apt to shrivel and diminish in weight. Begin by digging at one end of the rows, and continue on to the other, in order to take up all the roots. When they are collected, the large roots are to be separated from the small side-shoots, which must be trimmed off and divided into proper lengths, and, with the crown-buds, preserved for fresh sets. The former may be stored in dry sand, in a cellar—first a layer of sets, and then a layer of sand. The crown-buds will keep if laid in a heap and covered with dry sand.

The sooner liquorice is sold, the heavier it weighs; and the greener it is, the more virtue it contains. It is sold in three distinct forms, namely, in the roots, in powder, and in its inspissated juice. The first of these needs no explanation. The second is prepared by cutting the small roots into small pieces, drying them in an oven or kiln, and grinding them in a mill. The third kind is prepared by pounding the smaller roots and fragments with cold water, for nearly two days; after which the pulp is to be squeezed, and the juice boiled down, in an iron pot, to a pitchy consistence, and then rolled or stamped into sticks or cakes, which are sometimes sold under the name of "Spanish liquorice."

Liquorice-roots will keep a year, if laid in sand and stored in a cool, dry cellar; and if the sets, or runners and buds, are cut ready for planting, tied in bundles, and sent by land-carriage, they will keep a fortnight. If packed in sand, and sent by water, they will keep some three or four months, especially the more hardy buds.

LEEK.

(Allium porrum.)

The leek is a hardy biennial, for although it attains perfection in size and for culinary purposes the first year, it does not run to seed until

the second, the perfecting of which it often survives. The whole plant is eaten, being employed in soups, &c., and boiled with meat. The two principal varieties cultivated in this country are—

Broad Scotch or Flag.—A large and strong plant, with broad leaves growing only on two sides, like the flag. This has the preference.

Large London.—This differs from the other kind in the leaves growing around on all sides of the plant.

The seeds are sown as early in the spring as the season will admit, either in a seed-bed, to be transplanted, or in the sites where they are intended to perfect their growth. As soon as the plants are three or four inches in height, they may be hoed and thinned out to two or three inches apart. If the weather be dry, watering will strengthen and forward the plants. When they are six or eight inches high, they may be removed. They should be taken away regularly from the seed-bed; the ground being well watered previously, if not soft and easily yielding. When thinned out, they may be left to remain in the seed-bed six inches asunder, as they do not grow so large as the transplanted ones, which must be set by the dibble in rows ten inches apart each way, nearly down to the leaves, that the neck, by being covered with the earth, may be blanched. Give them an abundance of water at the time of planting, and shorten the long, weak leaves, but do not injure the root more than is possible. By this treatment, and by cutting off the tops of the leaves about once a month, as new ones are produced, the neck swells to a much larger size.

LETTUCE.

(*Lactuca sativa.*)

The many varieties of lettuce may be divided into two classes: the "Head," or cabbage kinds, with round heads and broad spreading leaves; and the "Cos" lettuces, with long heads, and upright, oblong leaves.

Early Curled Silesia.—A superior early variety, of very strong growth; leaves large, light yellow, wrinkled. It makes a large loose head of excellent flavor. For forcing and the first spring sowing, it is highly esteemed; seed, white.

Early White Cabbage.—An open spreading lettuce, grown mostly for an early spring salad; color, light yellow; seed, white.

Large Green-headed or Hardy Green is a hardy, dark-green, low-growing sort, with round leaves, and round hard heads; tender and excellent; the best of the green lettuces; seed, black. There is a variety which resembles this in the color and form of the leaf, called "Ice Head," but improperly so, for it runs up to seed without heading.

Fine Imperial Cabbage or Berlin is one of the best lettuces for general use; color, light yellow; seed, black. It heads finely, and answers well for summer growth.

Royal Cabbage.—This is the "Blond Summer" of the French; color, light yellow; leaves uniform, nearly all turned into the head, which is well formed, good sized, close, and a little flattened. It stands the heat well; seed, white.

Versailles.—Leaves large, thin, crimped, and very light colored; heads large and thick, but not very hard. It is prompt to head, but slow to run up; seed, white.

Superb Brown-headed.—A dark-brown curled variety, rather small and late, with close round heads, which cut open finely blanched, and very crisp. It remains a long time in head; seed, black, produced very sparingly. Of first-rate excellence.

Large India.—This is one of the largest varieties; in general appearance resembling the Silesia, but is less curled, and the leaves are whiter, and sometimes edged with pink. It forms very large round heads, which cut white, brittle, and almost transparent. No lettuce withstands the summer heat better, nor is more popular for market; seed, white, produced in small quantity.

Brown Dutch will endure the winter with less protection than most of the other sorts, and is generally sown in autumn. It grows in the cabbage form, but does not make a close head; seed, white. There is a kind with yellow seed, which is preferred by some.

Ice Cos.—This is a very brittle lettuce, with large light-green crimped leaves, which have an icy appearance. Heads oblong, rather loose, and very crisp; seed, white. It is the "Drumhead" or "Malta" lettuce of the English catalogues.

Paris Green Cos is one of the best of the Cos varieties. It grows upright, with long, narrow, and dark-green leaves. It should be tied up to blanch a week or ten days before cutting; seed, white. It soon runs to seed.

For the first cutting, sow as early in the spring as the ground can be worked, on a sheltered bed, made light and dry; and at intervals throughout the season, for a succession. Thin or transplant to one foot apart for heading. The hardy kinds may be sown in the fall, and protected through the winter by a light covering of straw, or cf cedar or hemlock boughs, when they can be obtained, which are less liable to smother the plants. The covering should be removed gradually in the spring. The best soil for lettuce is a very rich sandy loam. It is useless to undertake to grow good heads on poor ground, or thickly together.

MARJORAM, SWEET.

(Majorana hortensis.)

The sweet or knotted marjoram is a hardy annual, well known in gardens, much employed as a relishing herb in soups, broths, stuffings, &c. The young tender tops and leaves are employed together in summer in a green state, but in winter they are used dry.

The plant thrives well, if the situation be open, in a light, dry, and moderately fertile soil. It is propagated solely by seed in open weather, at the period of the flowering of our orchard fruits. It may be sown in drills six inches apart, at the depth of a quarter of an inch. No other cultivation is necessary than to hoe the plants occasionally, and to keep them free from weeds. When in flower, the herb is cut and dried after the manner of other aromatic herbs, and preserved for winter use.

MELON, OR CANTELEUP.

(Cucumis melo.)

The delicious flavor and perfume of this fruit has caused it to be sought after and cultivated in all parts of the world where the climate will admit of its growth. The varieties are numerous, but the following are most esteemed:

Green Citron.—A handsome, roundish fruit, flattened at the ends, and roughly netted all over; flesh thick, green, melting, very sweet, and high flavored.

Pine Apple.—A dark-green, oval melon, of medium size; rough netted; flesh thick, firm, juicy, and sweet.

Nutmeg.—Is of larger growth, and more globular shaped; flesh green, and very highly scented.

Skillman's Fine Netted is a small, rough-netted variety, flattened at the ends; flesh green, very thick, firm, sugary, and of the most delicious flavor. The earliest of the green-fleshed melons.

Large Yellow Canteleup.—A good-sized, nearly round fruit, netted, and slightly ribbed; flesh salmon-colored, thick, and musk-flavored; earlier than the green sorts.

Large Musk.—This is the largest variety; long oval shape, deeply ribbed; flesh, thick, light salmon-colored, and of peculiar musky flavor; early and productive. This kind is used in its green state for "mangoes."

Christiana.—A yellow-fleshed variety, which originated in Massachusetts. It is ten days earlier than the Nutmeg, but not quite equal to it in flavor, though an excellent sort. Its chief merit is its earliness, which renders it particularly valuable for a northern climate. The seeds of yellow melons are generally larger than those of the green, flatter, and a little crooked.

Cassabar.—A melon which has long been celebrated in Asia Minor and other parts of the East for its sweet, delicious flavor, as well as for its salutary effects.

Hunter or Hooseinee Canteleup.—A popular variety, brought originally from the valley of the Cashmere, and much cultivated in the District of Columbia, Maryland, and Virginia.

Plant late in spring, in hills five or six feet apart each way, well manured with old rotten compost; scatter a dozen seeds to a hill, and after they are out of danger from bugs, thin to three or four plants. When they have four or five rough leaves, pinch off the end of the main shoot, which will cause the lateral branches to put forth sooner. It will strengthen the growth of the vines, and the fruit will come earlier to maturity. A light, dry, sandy soil, and a dry atmosphere are most suitable. Melons should not be planted near other varieties, if it is desired to preserve them pure. They have arrived at perfection when the stem will cleave from the fruit. A very rough-netted skin is the most sure indication of a high-flavored melon.

WATERMELON.

(Cucurbita citrullus.)

The watermelon is held in high estimation in all warm countries, for its refreshing coolness and delicious sweetness. Plant in hills eight feet apart, in a sandy soil, well manured in the hills, as early as can be done with safety from frost, so that the fruit may come to maturity in the warm season, when they are the most agreeable.

Mountain Sprout or Long Carolina.—A large, long striped variety, with bright scarlet flesh, and drab-colored seeds; one of the very best in every respect.

Spanish.—Round, very dark green, with scarlet flesh, and black seeds. It is smaller than some of the other sorts, but has a very thin rind, and rich sugary flavor.

Long Island.—This is the common variety grown for New York market, and is either round or long, or both together; flesh, red; seeds, grey. It is earlier than either of the above.

Citron, for preserving, grows uniformly round and smooth, striped and marbled with light green; flesh, white and solid; seeds, red.

New Orange.—Peculiar for the division of its flesh from the rind, which may be taken off like the rind of an orange by a little separation with a knife. The shape is oval; color, light green; flesh, red, of medium quality; seeds, thick and short.

MINT.

(Mentha.)

Several species of mint are cultivated for medicinal and culinary use. Of these, the most important are "Peppermint," (*Mentha piperita*,) "Spearmint," (*M. viridis*,) and "Pennyroyal" (*M. pulegium*.) It may not be improper here to mention that the American herb known as "pennyroyal" is entirely different from the European plant bearing that name, and belongs to the genus Hedeoma. "Catmint," (*Nepeta cataria*,) though often useful as a popular medicine, is so extensively naturalized as to be rather a troublesome weed, and therefore needs no cultivation. They are all hardy perennials, natives of Europe, and have long been celebrated for their peculiar uses.

Peppermint, which is cultivated in low, rich, soft, marshy lands, especially such as can be flooded or irrigated, is employed almost entirely for distillation. It is also sometimes cultivated in gardens, for its young green tops and leaves, as a substitute for spearmint. There are two varieties of this plant, the "Narrow-leaved" and the "Broad-leaved," which are cultivated in gardens, and several variegated kinds that are considered as ornamental, particularly a reddish sort called "Orange" mint.

Spearmint is a pleasantly aromatic herb, which has been so generally introduced into all the older settlements of this country, that it is now very extensively naturalized. It is deservedly popular as a domestic medicine in relieving nausea, &c., and it is the species employed in preparing that most seductive beverage known as "mint julep." The young leaves and tops are also used in spring salads, and form an ingredient in soups. They are likewise employed to give flavor to

certain dishes, as peas, &c., being boiled for a time, and then withdrawn, in the manner of garlic. In order to have young leaves and tops all the summer, cut down some advanced stalks every month, which will be succeeded by new shoots; and to have dried "balm" for winter, cause others to complete their growth and come into blossom. Dry the crop, when gathered, in the shade, and afterwards store it away in bundles in a cool dry place, for future use.

All the species of mint are propagated by the same methods, namely, by parting the roots, by offset young plants, and by cuttings of the stalks. When increased by the roots, the operation is performed in the autumn or spring. Having some full roots from any established beds, divide them as expedient, and opening drills, with a hoe, about two inches deep and six inches asunder; place the roots in the drills, moderately close, and earth them over to an equal depth. If propagated by offsets, procure them in the spring from established plants, and dibble them in rows six inches asunder. If multiplied by cuttings of the young stalks, in May, June, or advanced summer, take advantage of showery weather, divide them into lengths of five or six inches, and plant them by dibble, six inches apart, inserted half way in the ground.

Propagated by any of the above methods, the plants set in spring or summer will come into use the same year. New plants require to be watered until they take root. Keep them clear of weeds. At the end of autumn, cut away any remaining stems, at which season, or in the spring, spread a little loose earth thinly over the beds.

In taking up the crop for salads or culinary use, gather the young green tops when they are from an inch to six inches in length, and in their advanced growth throughout the summer. When nearly full grown, in June, July, or August, or at the period they are beginning to flower, gather a store for winter; spread the heads thinly in some dry, airy place, shaded from the sun—to be well dried, and then tie up in bunches, for the house or store. When desired for distillation, let the plants attain full growth, coming into flower, and then cut and use the heads immediately. Peppermint being principally employed for distillation, should stand on the ground until the plants begin to flavor, as they are then in their highest perfection. Cut in dry weather, tie into bundles, and carry under cover, ready for immediate use. Full-grown stalks may be cut close to the ground as soon as the dew is off in the morning; for in the afternoon, and especially during bright sunshine, the odor of the plant is found to be much diminished.

MOREL.

(Phallus esculentus.)

This vegetable is a native of this country, and closely related to the mushroom, from which it is distinguished by the cap being hollow within, and adhering to the stem by its base, and latticed on the surface with irregular sinuations. The height is about four inches. It is in perfection and will be found from May to September, in wet banks, in woods, and in moist pastures, and should not be gathered when wet with dew, or soon after rain. If gathered dry, it will keep several

months. It is used either fresh or dried, as an ingredient to heighten the flavor of gravies, ragoûts, &c.

Culture.—We are not aware that this vegetable has been introduced into garden-culture, like the mushroom, but there can be no doubt of the attempt being attended with success. The spawn should be collected in June, and planted into dung-beds or ridges of soil differently composed, in order, by experiment, to come to the best mode of cultivation. Those who have practised the growing of mushrooms will find no difficulty in cultivating the *Morel* or *Mascul* plant.—*Buist's Family Kitchen Garden.*

MUSHROOM.

(Agaricus campestris.)

The mushroom belongs to a genus of plants comprising a great many species, of which, according to some authors, three hundred are natives of Great Britain. The kind most generally cultivated in gardens is the Agaricus campestris, which is thus described by McMahon: "The gills of this are loose, of a pinky red, changing to liver-color, in contact but not united with the stem; very thick set, some forked next the stem, some next the edge of the cap, some at both ends, and generally, in that case, excluding the intermediate smaller gills. Cap, white, changing to brown when old, and becoming scurfy, fleshy, and regularly convex, but with age flat, and liquefying in decay; flesh, white; diameter, commonly from one inch to three, or sometimes four or more. Stem, solid, one to three inches high, and about half an inch in diameter." Loudon says: "The mushroom is a well known native vegetable, springing up in open pastures in August and September. It is most readily distinguished, when of middle size, by its fine pink or flesh-colored gills, and pleasant smell; in a more advanced stage the gills become of a chocolate color, and it is then more apt to be confounded with other kinds of dubious quality; but that species which most nearly resembles it is slimy to the touch, and destitute of the fine odor, having rather a disagreeable smell; further, the noxious kind grows in woods, or on the margin of woods, while the true mushroom springs up chiefly in open pastures, and should be gathered only in such places."

Armstrong gives the following directions for cultivating the garden mushroom: "Prepare a bed, early in October, either in a corner of the hot-house, if you have one, or a dry and warm cellar. The width of the bed at bottom should not be less than four feet, and its lenghth in proportion to the spawn provided. Its sides should rise perpendicularly one foot, and should afterwards decrease to the centre, forming four sloping surfaces. We need hardly say that the material of the bed at this stage of the business must be horse-dung, well forked and pressed together to prevent its settling unequally. It should then be covered with long straw, as well to exclude frost as to keep in the volatile parts of the mass, which would otherwise escape. After ten days, the temperature of the bed will be sufficiently moderated, when the straw is to be removed, and a covering of good mould to the depth of an inch laid over the dung. On this, the seed or spawn of the mushroom (which are threads or fibres of a white color, found in old pasture

grounds, in masses of rotten horse-dung, sometimes under stable floors, and frequently in the remains of old hot-beds) is to be placed in rows, six inches apart, occupying all the sloping parts of the bed, which is again to be covered with a second inch of fresh mould, and a coat of straw. If your bed has been well constructed, your mushrooms will be fit for use at the end of five or six weeks, and will continue to be productive for several months. Should you, however, in the course of the winter find its productiveness diminished, take off nearly all the original covering, and replace it with eight or ten inches of fresh dung, and a coat of clean straw. This, by creating a new heat, will revive the action of the spawn, and give a long succession of mushrooms."

The garden mushroom is eaten fresh, either stewed or boiled; and preserved as a pickle, or in powder, or dried whole. The sauce commonly called "ketchup" is, or ought to be made from its juice, with salt and spices. Wild mushrooms from old pastures are generally considered as more delicate in flavor, and more tender in flesh, than those raised in artificial beds. But the young or butter mushrooms of the cultivated sort are firmer and better for pickling; and in using cultivated mushrooms, there is evidently much less risk of deleterious kinds being employed.

The soil employed should be virgin earth, with turf well reduced, neither too dry nor too wet; otherwise, it will not be capable of being beaten solid. It must be laid regularly over the beds two inches thick. From the time of earthing, the room or cellar should be kept at a temperature of 50° to 55° F. If higher, it will weaken or destroy the spawn; if lower, it will vegetate slowly; and if watered in that state, numbers of mushrooms will be prevented from attaining perfection. Water must be applied with extreme caution, being nearly as warm as new milk, and sprinkled over the beds with a syringe, or small watering pot. Cold water destroys both the crop and the beds. If suffered to become dry, it is better to give several light waterings than one heavy one. Beds thus managed will bear for several months, and a constant supply kept up by earthing one bed or more two or three months.

If, when in full bearing, the mushrooms become long-stemmed and weak, the temperature is certainly too high, and air must be admitted in proportion. As the beds decline, to renovate them, the earth must be taken off clean; and if the dung is decayed, they must be reformed, any good spawn being preserved that they may appear; but if the beds be dry, solid, and full of good spawn, a fresh layer of compost, three or four inches thick, must be added, mixed a little with the old, and beaten solid as before.

Mushrooms may be grown in a cellar, or other vaulted place, with equal success, and not unfrequently with a greater advantage, the same rules being adopted; but no fire is necessary, and less water.

Antidote to Poisonous Sorts.—All fungi should be used with great caution, for even the edible garden mushrooms possess deleterious qualities when grown in certain places. All the edible species should be thoroughly masticated before taken into the stomach, as this greatly lessens the effects of poisons. When accidents of this sort happen, vomiting should be immediately excited, and then the vegetable acids

should be given, either vinegar, lemon-juice, or that of sour apples; after which, give ether and anti-spasmodic remedies, to stop the excessive bilious vomiting. Infusions of gall-nuts, oak bark, and Peruvian bark, are recommended as capable of neutralizing the poisonous principle of mushrooms. It is, however, the safest way not to eat any of the good but less common sorts, until they have been soaked in vinegar. Spirits of wine and vinegar extract some part of their poison; and tannin matter decomposes the greatest part of it.

MUSTARD.

(*Sinapsis.*)

Mustard is a hardy annual, cultivated as a small salad, for greens, and for the seed, which are extensively employed for medicinal purposes, and for seasoning pickles. The common table mustard is prepared from the flour of the seed. For salad, it is sown thickly, and used like common cress. The culture for seed appertains more to the farm than to the garden. Sow early in the spring, in two-foot drills, and thin to six inches. The crop must be gathered before it is fully ripe, in a cloudy day, or early in the morning, to prevent the seed from shelling out.

The "White" (*Sinapis alba*) is usually preferred for salad. The leaves are light green, mild and tender when young; seed, light yellow.

The "Black" or "Brown," (*S. nigra*,) is a larger plant, with much darker leaves; seed, brown, and more pungent.

NASTURTIUM, OR INDIAN CRESS.

(*Tropæolum majus.*)

An annual, a native of Peru, cultivated both for use and ornament. Its beautiful orange-colored flowers serve as a garnish for dishes, and the young leaves are excellent in salads. The flower-buds scarcely formed, and the green seed-pods, preserved in vinegar, make a pickle esteemed by many superior to capers. Sow early in the spring, in drills one inch deep, the "Tall" variety by the side of a fence, trellis-work, or some other support, to climb upon; and the "Dwarf" to form borders for the alleys. They will thrive in good ground in almost any situation, but are most productive in a light soil.

OKRA, OR GUMBO.

(*Hibiscus esculentus.*)

This is an annual from the West Indies, cultivated for its green seed-pods, which are used in soups, or stewed and served like asparagus. It is highly esteemed at the South, where it is considered a very wholesome vegetable. Plant late in the spring, after the ground has become warm, in hills about two and a half feet apart, and thin to three plants in a hill. Hoe often, and earth up a little to support the stems. The pods should be gathered while quite young and tender. There are two varieties, the "Long White," with large white ribbed pods, and the "Short Green," with smaller, green, and smooth round pods. Okra is easily preserved for winter use by slicing the pods into narrow rings and drying them upon strings, hung up and exposed to the air.

ONION.

(*Allium cepa.*)

The onion is one of the most important of the culinary vegetables cultivated in temperate latitudes. The numerous varieties are easily modified under the influence of soil and climate. The following distinct sorts are most esteemed:

Early Red.—This very early variety originated in Wethersfield, Connecticut, by selecting the earliest for seed for a series of years. It is rather smaller, usually lighter colored, and more flat shaped than the Large Red; close grained and heavy. Fit to be gathered the last of July; very productive, and keeps well.

Wethersfield Large Red is the kind mostly grown at Wethersfield. It grows to large size, deep red, thick, approaching to round shape, fine grained, pleasant flavored, and very productive. It ripens in September, and keeps well.

New Danvers Yellow.—This fine variety originated in Danvers, Massachusetts. It is a thick, heavy, straw-colored onion, mild flavored, and yields most abundantly; ripens early, and keeps equal to the best. It is taking the place of the common Yellow wherever it becomes known.

Yellow Dutch.—The common yellow variety, rather flat shaped, and excellent flavored. This is the "Strasburg" of the English catalogues, and the "Silver Skin" of the Eastern States. Good to keep.

White Portugal.—A mild, pleasant onion, which grows to fair size and handsome shape, but is very hard to keep, being liable to gather moisture unless spread very thin. It is called "Silver Skin" in the Middle States, where it requires two seasons to grow to full size. This, and the Yellow, are sown there early in the spring, very thickly in beds or drills; and about the middle of July, or whenever the tops die down, the little bulbs called "Button" onions, or "Sets," are gathered, and kept spread thinly in a dry, airy loft. These little bulbs, the next spring, are set along thinly in shallow fourteen-inch drills, and left to grow without any covering whatever.

The "White sets" are extremely difficult to keep in a body, and often arrive in very bad condition when shipped to a warm climate.

The "Yellow sets" keep much better, and on this account should be chosen for transportation.

Onion seed is sown in Wethersfield from the first of April to the middle of May; the earlier the better, provided the ground is dry enough to work light and fine. After preparing the land by manuring heavily, and harrowing and raking fine, draw drills fourteen inches apart, with a marking rake, and sow at the rate of eight pounds to the acre, if wanted for bunching. For large bushel-onions, six pounds will be sufficient. The sowing is mostly done with machines, which can be graduated to sow any desired quantity to the acre. If convenient, it is better to go over the ground with a light roller immediately after the sowing. It is customary to weed them three times. At the first two, the earth is drawn up a little to the plants; and at the third, or last weeding, it should be brushed clean away with the fingers, to give them an opportunity to bottom entirely above ground. Onions

are an exception to the theory of rotation of crops. They succeed equally well any number of years on the same ground, if kept highly enriched with hog-dung, or fine yard manure, spread on every spring, and turned in with a light furrow. A top-dressing of wood ashes applied after the second weeding is very beneficial to this crop, as will soon be observed by the dark and healthy change of color given to the plants.

The above mode of culture will produce a fair crop of good-sized onions in the Middle and Western States, particularly of the Large Red and Yellow varieties, if sown very early in the spring, and thinned out two or three inches apart in the drills.

To keep onions in quantity through the winter, deposite them when perfectly dry, eighteen inches thick, evenly, on a tight floor in an out-building, leaving a space of two feet next the walls of the room on all sides; spread a sheet over them and tuck it close round the edges of the heap; fill the space with fine hay, and tread it hard; then cover the whole two feet thick with the same, and the onions will keep in perfect order. They should never be disturbed while frozen, but as soon as the frost is completely out in the spring, remove the covering and spread them all over the room, and open the doors and windows to give them air in pleasant weather.

The above mode of culture, it is believed, will produce fair crops of good-sized onions in the Middle States, particularly of the Large Red variety. The Yellow will undoubtedly succeed well.

ORACH.

(Atriplex hortensis.)

The leaves of this plant are cooked and eaten in the same manner as spinach, to which it is much preferred by many persons, although it belongs to a tribe the wholesomeness of which *is very suspicious.*

This plant flourishes best in a rich, moist soil, in open ground. The seed may be sown about the end of September, and again in the spring for succession, in drills six inches apart. When the seedlings are about an inch high, thin them to six inches asunder, and those removed may be planted out at the same distance in a similar situation, and watered occasionally, if needed, until established. The leaves must be gathered for use while young; otherwise, they will be stringy and worthless.

PARSLEY.

(Petroselinum sativum.)

A well-known and agreeable savory herb, used as a garnish and for seasoning. Soak the seed a few hours in warm water, and sow very early in the spring, in one-foot drills. Parsley seed is slow to germinate, particularly if sown late in the season, when it often fails entirely, in dry weather. To have it green through the winter, remove some plants and set them in a light cellar.

Plain Parsley.—This is the hardiest and strongest growing variety.

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Leaves, dark green, plain, longer than the Curled, and better flavored for seasoning. A covering of straw or evergreen boughs will ordinarily protect it through the winter.

Curled or Double, is more dwarfy and tender; leaves, yellowish green, and very beautifully crimped and curled. It is used principally as a garnish for the table.

PARSNIP.

(Pastinaca sativa.)

This is a hardy biennial, common in most gardens, where it should be accommodated with the deepest and richest soil. Sow early in the spring, in fifteen-inch drills, and thin to eight inches apart. There are several varieties.

Long Smooth.—Roots, very long, white, smooth, free from side-roots, tender, sugary, and most excellent flavored. The tops are small and tinged with red at the crown, which rises from the centre, surrounded by a slight depression. It keeps through the winter perfectly well, where grown without any protection. It was originated from the "Hollow-crowned" variety from England, by Messrs. Comstock, Ferre & Co., of Wethersfield, in Connecticut.

PEA.

(Pisum sativum.)

The pea is a hardy annual, in the highest estimation in all countries, as one of the most agreeable culinary vegetables, in its green state, and there is often much emulation among seed-growers to obtain the very earliest variety, and among amateur gardeners to present at their own table the first dish of the season. The varieties are very numerous, though many of the names are synonymous. The following, comprising the best assortment, when sown at proper intervals, will give a succession throughout the season:

Comstock's Early Dwarf.—The very earliest and greatest bearer of all the dwarf peas, growing only to ten or twelve inches high in the richest soil. The pods, which fill well, with six or seven peas of fine quality in each, are above medium in size. This pea was introduced into the trade this year, and is spoken of with the highest praise, being considered a great acquisition to the list of early peas

Early Prince Albert.—About two feet high; pods and peas small, good flavored, but not very productive.

Extra Early May.—This is a very early variety, growing about two and a half feet high. Pods, rather broad, but well filled with good-sized peas; moderately productive, ripening nearly all at once.

Early Warwick.—A very superior early pea, about a week later than the Extra Early. About three feet high; pods and peas, medium size, of excellent quality, and a good bearer. A standard sort.

Early Washington.—This is often confounded with the Early Warwick.

Early Frame, or June, is a very celebrated pea, about a week later

than the Early Warwick, and grows to the same height. Pods, medium size, round, mostly containing five or six peas; hardy, very prolific, and of an excellent quality.

Early Double-blossomed.—The kind bearing this name is about as early as the Early Warwick, and of the same height; pods, long, and well filled. A good bearer, and very excellent family pea.

Early Charlton.—About three or four feet high, and of strong growth. Pods, large, broad, and rather flattened, mostly containing six or seven peas; hardy, prolific, and about a week later than the Early Frame.

Bishop's Dwarf.—A very prolific and remarkably dwarfy variety, growing only about a foot high. Pods, short and broad, mostly containing four or five peas; seed, yellow; about a week later than the Early Frame. It continues longer in bearing than most others. Plant early, in drills two feet apart, and lay them over by hilling up higher one side in the course of cultivation.

Dwarf Blue Imperial.—Grows about two and a half feet high, and very strong. Pods, large, long, pointed, rather flat, containing eight or nine peas. Seed, large, blue, and a little flattened. A good bearer, and one of the best varieties for summer, but requires to be planted early, or they will be apt to mildew.

Flack's Dwarf Victory.—This new variety resembles the Blue Imperial; pods and peas, larger; height, three feet; seed, large, light blue, and a little shrivelled. It is a very fine pea.

Dwarf Blue Prussian.—About three feet high, and strong growth. Pods, long, and rather round, containing eight peas; seed, blue, and a little oblong. One of the greatest bearers, and an excellent summer pea.

Large White Marrowfat.—Is an American variety, cultivated more extensively for the summer crop than all the others. About five feet high, and strong growth. Pods, large, round, rough, light-colored, and well filled; seed, large, round, and yellow or white, according to the soil in which they are grown. This is so well known, that it is needless to speak of its good qualities. It is undoubtedly the best for summer use, and one of the greatest bearers in the garden or field. The same pea is sold under the name of "Dwarf Marrowfat." An excellent sub-variety, about a week earlier, has obtained, around Albany, the name of "Missouri Marrowfat."

Matchless Marrowfat.—This is a very strong-growing pea, rising six feet high, very productive and of most excellent quality, but late. Pods, large, long, and full; seed, very large, a little shrivelled; yellow and yellowish green, mixed.

There is another variety called "Irish Marrowfat," with large peas and longer pods. The "Black-eyed Marrowfat" is also a fine variety of strong growth, with large peas of excellent quality. It is a popular pea at the South.

Dwarf Sugar.—About three feet high, and of very strong growth. Pods, long, and slightly curved, containing mostly seven peas, which show in relief along the pods. They are usually cooked in the pods, like snap beans. Of excellent quality, but rather late; only a moderate bearer.

Champion of England.—Universally admitted to be one of the very richest and best flavored peas grown, and very productive. It is early, with large and long pods; height, three to four feet; seed, whitish green, shrivelled.

Bishop's New Long-podded.—This is the most productive English dwarf pea grown. producing a great many pods to a stem, and of good quality; one and a half to two feet high. Sow thickly in rows two feet apart.

There are a great many fancy varieties, which are of delicious flavor, but generally moderate bearers, and very high-priced. Every year, some new peas come out in the catalogues of seedsmen with high-sounding names, which are quoted at enormous prices. Occasionally, a really valuable acquisition is added to the list, but in general, they should receive the cautious attention of the common cultivator, whose object is to obtain a certain crop.

The planting for an early crop should be made in the spring, as soon as the ground can be worked, in a warm, dry situation, and covered about three inches. At the South, where they will endure the winter, the planting for the first crop is made in October and November. The ground should have been manured the year previous, or the peas will be apt to grow too much to straw. Use thoroughly decomposed manure, if any, just before planting. The height to which all peas grow depends, in a great measure, upon the richness of the soil, and the wetness of the season. In a rich soil and wet season, they will sometimes outstrip all expectation, and the vender is likely to be faulted for selling spurious seed. They are usually planted in double rows, from three to four feet apart, and those requiring it, bushed when about six inches high. The large and later sorts do better at a greater distance apart, leaving a broad space for planting low-growing vegetables between the rows. They should be kept clean, and earthed up twice in their growth. A new mode of growing the common early and marrowfat peas, which succeeds very well in small gardens, and which is practised to some extent for marketing, is to scatter about a dozen peas in every hill, with early-planted potatoes, of the Mercer or some other small-topped variety; hoe them in the hill along with the potatoes; they will grow up and fall together between the rows, and produce a very fair crop. As soon as the peas are gathered, the straw must be pulled up and removed. The potatoes are not much affected, and a supply of peas is obtained with very little trouble.

PEPPERS.

(Capsicum annuum.)

The pepper is a tender annual, employed as a hot, pungent seasoning, and for pickling, and is universally esteemed as a very wholesome vegetable. Sow early, in a hot-bed, or in the open ground, in a seed-bed, about the middle of spring, in light, warm ground. Transplant when three inches high, one foot apart, in eighteen-inch drills, and earth up a little at one or two hoeings. Guano, hen-dung, or any other bird-manure, applied upon the surface and hoed in when the plants are about six inches high, will be found to increase the product wonderfully.

Long Cayenne.—This is a long, red, tapering variety of dwarfy growth, very hot and pungent; used for pepper-sauce, and for seasoning.

Cherry.—A small, smooth, round, red variety, of uniform shape, very hot; a great bearer.

Large Squash.—Large and thick; flat, tomato-shaped; rather mild, and the very best for pickling alone; very productive.

Large Bell or Bull-nosed.—A very large sort, of a more square form, mild, thick, and hard; suitable for filling with cabbage, &c., for a stuffed pickle.

Sweet Mountain or Mammoth.—A new variety, of nearly the same form, but much larger than the last described. It is used mostly for pickling.

Sweet Spanish.—There are two sorts—one large and long, and the other of a more square shape—neither of which has the least pungent flavor; used for a salad, and for pickling; very late, and rather difficult to keep, when pickled.

POTATO, COMMON.

(Solanum tuberosum.)

This important esculent is too well known throughout the civilized globe to require description. To enter into a general detail of the merits of the numerous varieties in cultivation would lead to erroneous opinions, as one sort which might be approved in one section of the country would be condemned in another. The "Mercer," or "Meshanock," is a universal favorite throughout the Middle and Western States, as well as in some parts of New England and New York. In Massachusetts, the "Carter" and "Pink-eyes" have long been celebrated. In Pennsylvania, the "Foxite" and "Fox's Seedling" stand in high repute; and, in like manner, others might be enumerated in various States.

No vegetable varies more in quality, in different soils, than the potato; one which is agreeable and well flavored in a light soil will be coarse or rank in a clayey or retentive one. A curious fact has been observed, that white potatoes are best when grown on light sandy soil, while black and red-skinned ones are most productive in those which are moist, strong, and heavy.

Potatoes are usually propagated by tubers, or roots; but it is easy to multiply them several other ways. Cuttings from the top branches, set in the ground, will produce a considerable crop. These will strike root even if planted bottom upwards. The sprouts broken from potatoes, if the tuber is in a healthy state, will also produce roots. So will the seeds of the apples, or balls, as also the bare eyes, or buds, or even a piece cut out of the heart of a potato. In the preparation of the ground, it should be ploughed or spaded deep for this crop; because roots will commonly grow as low as the soil is stirred and no deeper, perhaps green-sward land excepted; and the more the ground is pulverized before planting, the better will be the crop. Those tubers are accounted best for eating which are raised without dung. New land, or that which is burnt over, produces excellent roots without any other manure. If necessary to add dung, unfermented horse-manure, perhaps, is the best of any applied in the hill over the planted sets.

An excellent crop has been produced by adding a bundle of old weather-beaten salt hay, at the time of planting, in each hill. The period of the flowering of the apple and pear, perhaps, is the right season for planting in a warm dry soil; though planted a month or two later, in the Middle and Western States, they will arrive at maturity and produce well. The "Bermuda" potato can be planted in the latitude of Washington as late as July and produce a fine crop.

The common method of planting potatoes in hills about three feet apart may be as good as any in rough ground, or that which is not well subdued; but in a light, rich, mellow soil, well pulverized, the drill method is to be preferred. The sets may be planted either in single rows two and a half feet apart, and from seven to nine inches asunder along the rows, or in double ones a foot apart. It is no more labor to cultivate in drills than in hills. If the soil be dry, the seed should be planted deep, and under the manure when used; but if it be moist, it should be placed on the top of the manure, or not covered deep. As soon as the plants are grown to a height of four or five inches above the surface, or earlier if the ground be weedy, they may be hoed, drawing towards them a little fine earth. This operation should be repeated three times in the course of the season, taking care not to earth up the plants too much, as the ridges or hills should be rather broad than steep, and flat on the top, in order that the water which falls in rain may not be too much diverted from the roots. The last hoeing should be finished before the plants are in blossom and before the branches begin to trail upon the ground; otherwise, a new set of roots will be formed too late to get their full growth, which will rob the former sets of their nourishment.

As soon as the tops are dead, either by ripeness or frost, the tubers may be taken up. If they lie in the ground until they are soaked by the heavy autumnal rains, they will be injured, and the labor of digging increased.

POTATO, SWEET.

(Batatas edulis.)

In warm climates, the sweet potato is cultivated in a similar manner as the common potato is at the North, but requires much more room; for the trailing roots extend four or five feet each way, often sending out forty or fifty large tubers to a plant.

In the Middle States, as soon as the frost is out of the ground, which is generally from the first to the last of April, the tubers, or sets, are planted in a hot-bed, made by taking some rough boards, setting them on edge, in any convenient place, where the bed will have the benefit of the rays of the sun. The box or bed thus commenced may be four feet wide, sufficiently extended in length for the quantity of sets intended to be put down, and fifteen inches deep. The box is then filled with fresh horse-manure, directly from the stable, not too coarse nor too fine, which must be trodden down until twelve inches deep. Next, a few buckets of water may be thrown upon the bed so as to make it damp, but not wet. Now put on a layer of sandy loam one and a half inches deep; place the sets promiscuously, about an inch apart, and three inches from the boards which form the box; and then cover the sets with the same kind of loam to the depth of two inches. Do not wet

the loam any more than is natural to it. Cover the bed all over with hay or fine straw to the depth of six inches, when pressed down, which may be done by putting on some loose boards in a manner to effectually shed off heavy rains.

Let the bed now be examined daily, by uncovering a small place near the centre, and thrust in the hand and ascertain whether or not the temperature is too high. If too warm, uncover for a day or so, and be sure to cover up the sets at night, and continue to keep them covered until some of the sprouts make their appearance above the surface, which they will generally do in ten or fifteen days; then take off the covering, and put it on no more unless the weather should become cool, with a prospect of frost. The tubers, or sets, should not be taken out of the bin or hole where they have been kept during the winter before the hot-bed is ready to receive them; for they will injure by wilting or drying. As soon as the young plants begin to grow, after being uncovered, let them be watered as often as required. Should the weather prove dry, the hot-bed will afford three or four crops of plants.

In selecting ground for transplanting, take the poorest and the most sandy you have; give it a good coat of well-rotted manure, plough it under tolerably deep, and let it lie a week or ten days; then run over a harrow to pulverize the ground and keep it clean. As soon as the plants are nearly large enough to remove, throw up the land into ridges, about three feet apart, and rake off their tops even and flat. Let it remain until the appearance of rain; or if the weather prove dry, plant out just before night and water well. The plants are old enough to remove when the leaves obtain their natural size. In taking them up, place the left hand about the roots, "grabbing" up a quantity of earth, and draw them from the bed with the right, in order that a small ball of earth may adhere to each. Then plant them along the centre of the tops of the ridges, twelve inches apart. Some prefer to plant in hills, three feet asunder, which can easily be done with a hoe, after the ridges are made, as directed above. As the crop progresses, dress the plants with a hoe as soon as any grass or weeds appear; then cover the vines with earth as they extend over the ground. When the plants require no more tilling, pull the vines loose from the ground, to prevent them from taking root.

To keep sweet potatoes through the winter, brick up a bin or hole under the cook-house floor, directly in front of the hearth, or under the stove. Then put in the tubers dry, and keep them so, as they are used. The tubers may also be kept in boxes or barrels, mixed with dry sand, in a moderately cool, dry place.

PUMPKIN.

(Cucurbita pepo.)

The pumpkin more properly belongs to the farm than to the garden. Plant about middle of spring, in manured hills, eight feet apart, and leave but two or three plants in a hill. It is customary among New England farmers to stick two seeds in every fourth hill in every fourth row in their corn-fields. The "Connecticut Field" is a large, soft-rinded variety, excellent for pies and for feeding stock. The "Cheese

Pumpkin" is flat-shaped, and salmon-colored. It resembles more winter squashes, and ought to be classed with them.

RADISH.

(Raphanus sativus.)

An annual, originally from China, very generally grown in all gardens. It is cultivated principally for the root, which should always be eaten before it becomes tough and pithy. The young seed-leaves are sometimes used as a small salad, and the green seed-pods as a pickle.

For the first crop, sow as early in the spring as the ground can be worked, and every two weeks throughout the season for a succession. A warm, sandy loam, made rich and light by some good strong manure, will be most likely to afford them brittle, and free from worms. Sow in twelve-inch drills, and thin to two or three inches apart.

It should be borne in mind that radishes must have plenty of room, and be grown quick, or they will invariably be tough and wormy. In the heat of summer, they ought to be watered very freely.

Early Short-topped Long Scarlet.—This is the standard sort grown in private gardens, and for market; when true and pure, it has a bright scarlet root, and a very small top. In suitable soil, it grows quick, half out of ground, and very brittle.

Long Salmon.—Longer and lighter colored than the above, with a larger top; a few days later.

Demi-Long Rose.—A very early and handsome variety, from France, nearly allied to the Scarlet Turnip; of a lively rose color and oblong shape; top, very small; of very good quality, but rather apt to grow hollow. It is extensively grown by the market gardeners of Paris. It is also in great repute in New Orleans.

Scarlet Turnip.—A small, round, red, turnip-shaped radish, with a small top, and of very quick growth; mild and crisp when young, but soon gets pithy.

White Turnip.—Like the Scarlet in shape, but in color pure white. It is later, and will bear the heat longer without becoming spongy.

Yellow Turnip.—This is an oblong, turnip-shaped, and russet-colored sort, growing to a large size, with pretty large top. It is the very best to stand the heat and drought of summer.

Black Fall or Spanish.—An oblong, black radish, of very large size and firm texture, with dark-green leaves. It is sown rather earlier than the fall turnips, and must be stored in sand in the cellar for winter use. It will keep good till spring.

Rose-colored China Winter.—Recently introduced from China. Its form is rather conical, and very smooth; of a lively rose color; flesh, firm, like the black radish, but more pungent. Cultivation, the same as for that variety.

RHUBARB.

(Rheum rhaponticum.)

A hardy perennial from Asia, cultivated in gardens for the leaf-stalks, which are used for pies and tarts. Within a few years, the cultivation of this very grateful and wholesome vegetable has been extensively in-

creased, so that immense quantities are now annually sold in all the large markets. No private garden should be without a bed of it. New varieties, of enormous size, have been produced by the emulation of gardeners, and are held at high prices, as they can only be propagated from the root. The seed cannot be relied upon for the reproduction of the same variety. Sow early in the spring, in a seed-bed. In the fall, transplant to three feet asunder each way, in hills enriched with half a bushel of well-rotted manure. The stalks should not be plucked till the third year, and the plant never allowed to exhaust itself by running to seed.

Mitchell's Early Albert.—The earliest sort cultivated; of good size, fine flavor, and tender throughout the season; the lower part of the stalk is red.

Tobolsk.—This early variety is small, when compared with the large sorts, but inferior to none of them in excellence of flavor; color, rose red. In use from early spring till fall.

Myatt's Victoria.—A very large, red, rich-flavored variety, of the highest estimation. Plant out this and the following variety five feet apart.

Cahoon's Mammoth Seedling.—This is the largest variety grown, a leaf and stalk of which having weighed eight and a half pounds. A stalk was twenty-five inches long, five and a half inches wide, and three inches thick; the leaf measured twenty-two feet in circumference. The stalks are green, specked with red; leaves unglazed.

ROQUET.

(Brassica eruca.)

This plant is an annual, and indigenous to France. The seed is sown very thin at the beginning of spring, and subsequently in succession, if it is desired to have fresh leaves during the summer. In cultivating, it is only necessary to keep the ground clear of weeds, and water the plants frequently, should there not be rain. By these precautions, the acrid flavor of the plant is diminished, which is less perceptible in the young leaves when used as a salad. The flowers, when recently open, have an agreeable odor, like those of the orange.

ROSEMARY.

(Rosmarinis officinalis.)

Rosemary has a fragrant, aromatic smell, and a warm, pungent taste, the leaves and tender tops being the strongest; the flowers, by themselves, are much weaker, but more agreeable. The uses of this herb in domestic medicine are well known.

There are three varieties of this plant, the "Green," "Golden-striped," and "Silver-striped." The first is the one generally cultivated. It thrives best in a poor, light soil, mixed with old mortar or other calcareous matter. In such, or when the plants are self-raised on an old wall, they will bear a considerable degree of cold; but in a rich soil, they lose much of their aromatic nature, and perish in frost.

This plant is propagated by cuttings and rooted slips, during any of the spring months, or by layers in the summer. But the finest plants

are raised by seed. By layers, is the best mode of propagating the Gold and Silver-striped varieties. The seed may be sown at the period of the flowering of our orchard fruits, in drills half an inch deep and six inches apart. The rooted slips and the cuttings of the young shoots should be from five to seven inches long, and planted in a shady border, in rows eight or ten inches asunder, previously removing the leaves from the lower two-thirds of their length. Layers may be formed by cutting young branches half through on their under sides, and pegging them down an inch or two below the surface; by autumn, they become established plants. Water must be applied abundantly at the time of planting, and occasionally afterwards should the season prove dry.

RUE.

(Ruta graveolens.)

Common rue is a hardy, evergreen undershrub, having a strong, ungrateful odor, and a bitter, hot, penetrating taste. The leaves, if much handled, are so acrid as to irritate and inflame the skin. It was much used by the ancients, who ascribed to it many excellent virtues. At present, it is used to some extent in domestic medicine.

This plant thrives best in a poor, clayey loam, mixed with calcareous rubbish, in an open situation. It is propagated by slips and cuttings, as well as from seeds, the first two modes being usually practised as being most easy. It may be planted or sown at any time during the spring—the seed in drills six inches apart and a quarter of an inch deep. The rooted slips or cuttings may be planted on a poor, shaded border, and watering occasionally is necessary until taking root. The plants may be removed in autumn. During their after-growth, they should be kept pruned into a shrubby form, and not be allowed to produce seed.

SAGE.

(Salvia officinalis.)

The leaves of this useful perennial are much employed in stuffings and sauces for many kinds of luscious and strong meats, as well as to improve the flavor of various other articles of cookery. The decoction called "sage tea" is well known in domestic medicine.

The principal varieties are the "Common Green," "Wormwood," "Green" with variegated leaves, "Red" with variegated leaves, "Painted" or "Party-colored," "Spanish" or "Lavender-leaved," and "Red."

A dry, moderately fertile soil is best suited to the growth of this plant. It may be propagated by cuttings, either of the preceding or of the same year's growth; if of the first, plant at the period of the flowering of the apple or pear; but if of the latter, not until a month or six weeks later. The shoots of the same year are usually employed, as they more readily send out roots, and assume a free growth. The outward and most robust shoots should be chosen, and cut from five to seven inches in length. After removing all the leaves, except the top ones, insert by the dibble, almost down to these leaves, in rows six inches apart each way, in a shady border, in time of moist weather;

otherwise, water must be given immediately, and occasionally repeated until they have taken root. If grown from seed, it may be sown at the period of the flowering of our orchard fruits, in drills a quarter of an inch deep and six inches apart. When two or three inches high, thin the plants to half a foot apart, and those removed prick out to a similar distance. In the autumn or succeeding spring, as the plants are strong or weak, remove them to their final sites. In the after-culture, the decayed flower-stalks, stunted branches, &c., may be removed in early winter and spring, and the soil of the beds slightly turned over. When the plants have continued two or three years, a little dry, well-rotted dung may be turned under in early spring. Attention to the mode of gathering has also an influence in keeping the plants healthy and vigorous. The tops ought never to be cropped too close, so as to render the branches naked or stumpy.

SALSIFY, OR OYSTER PLANT.

(Tragopogon porrifolius.)

Salsify is a hardy biennial, with a grassy top, and a long, white, tapering root, nearly resembling a small parsnip. It closely assimilates to the taste and flavor of the oyster, when properly cooked ; and by many persons is esteemed as a very delicious vegetable. The roots may be taken up late in the fall, and preserved in moist sand, or allowed to stand out all the winter. In the spring, the young tops are sometimes used for greens. It is known also by the name of "Vegetable oyster."

Sow in the spring in fourteen-inch drills, and thin to six inches. Cultivation, the same as for carrots and parsnips.

SAVORY.

(Satureja.)

There are two species of savory cultivated for culinary and medicinal purposes. Their warm, aromatic, pungent leaves are much esteemed in salads and broths.

"Winter" or "Perennial" savory (*Satureja montana*) is a hardy undershrub, indigenous to the south of France. "Summer" or "Annual" savory (*S. hortensis*) is a hardy herb, a native of Italy. Both species may be propagated from seeds sown in open ground at the period of the flowering of the peach, in a light, rich soil. If moderately thinned, the young seedlings may either remain where sown, or be transplanted into rows. Of the Winter savory, when the seedlings are about two inches high, they are suitable for planting out. The strongest should be selected when the weather is moist, and set in nursery rows six inches asunder, to remain until autumn, or the following spring, when they are to be transplanted, with balls of earth attached to their roots, in rows a foot apart, where they are finally to remain. When designed to have the savory of either species remain where sown, the seeds may be put into shallow drills, either in beds, or along the edge of any bed or border, by way of an edging.

The Winter savory may also be propagated by slips or cuttings when planted in the spring or early summer. The slips may be cut

five or six inches long, and planted with a dibble in a shady border, in rows six inches asunder, giving them occasional waterings, until they will have taken root. By September or October following, they will be ready to transplant.

SCORZONERA.

(*Scorzonera hispanica.*)

A native of Spain, resembling the salsify plant in flavor and character, and is cultivated more for variety than for absolute utility. The seeds are sown annually in an open, light spot of ground, at the period of the flowering of the apple and pear. The ground may be trenched, turning under a little dung with the bottom spit. Sow in drills half an inch deep, and twelve inches asunder. Thin the plants after they are up, to ten inches apart, and the roots will continue to increase until fall. They may remain in the ground, to be drawn as they are wanted, or entirely taken up in autumn, when their leaves decay, and preserved during the winter in dry sand.

SCURVY-GRASS.

(*Cochlearia officinalis.*)

A biennial, having a warm, acrid, bitter taste, and a pungent, rather unpleasant smell, when bruised. It is sometimes eaten as a salad, with the water-cress.

This plant flourishes best in a moist, sandy soil. The seeds are sown as soon as they are ripe, in summer, in drills eight inches apart, and half an inch deep. Thin the plants to eight inches asunder, and those removed may be transplanted to a bed at similar distances, giving water at the time, and frequently afterwards, until fully established. The leaves will be fit for gathering the following spring.

SEA-KALE.

(*Crambe maritima.*)

This hardy perennial is found growing on the sea-coasts of Britain. It is cultivated for its blanched shoots, which are cooked like asparagus, and is esteemed as a delicate and wholesome vegetable. As yet, it is but little grown in the United States.

Sow the seeds early in the spring, an inch deep in fourteen-inch drills. When the plants are one year old, transplant them eighteen inches apart, in straight rows five feet asunder. The ground must have been thoroughly trenched and manured. Late in the fall, when the leaves have separated themselves from the crown, heap over each plant a shovelful of clean sand or ashes, and earth up a ridge a foot and a half high over the rows, from a trench dug along the space between them, and beat it smooth with the back of the spade. In the spring, after the cutting is over, the earth should be levelled into the trenches, so as to expose the crowns of the plants, and a good coat of strong manure dug in around them. It is adapted to the coldest climates, and deserves to be more extensively cultivated.

SHALLOT, OR ESCHALLOT.

(*Allium ascalonium.*)

This vegetable is esteemed for its bulbs, which have a strong but not unpleasant odor, and is preferred to onions, by some, for various purposes of seasoning in cookery; the taste, however, is somewhat stronger than that of onions. They are particularly relished by epicures in preparing a beef-steak.

The two principal varieties are the "Common" and the "Long-keeping." The former puts forth long, slender, dark-green leaves, but the latter is more dwarfy in its habits, with larger bulbs, which keep good for nearly or quite two years.

The plant is propagated by offsets, each of which will increase in a similar manner as its parent, and may be planted out either late in autumn or early in spring. Autumn, however, is the best season, if the soil is sufficiently dry. If planted in beds, let them be three and a half feet wide, elevated three or four inches higher than the alleys, and the surface of the bed a little crowned. Set out the rows nine inches apart from centre to centre, planting the offsets singly with the hand upon the surface of the bed, six inches apart in the row, just pressing each bulb firmly down into the soil. See occasionally that they are not cast out of their places by vermin or other causes; or each bulb may be covered either with a little old tan-bark or coal-ashes, in little ridges along the rows, an inch and a half or two inches deep. When the bulbs are well established and growing, this covering should be removed with the hand. No other culture is required, except earth-stirring.

The bulbs may be taken up for storing, when full grown—say about mid-summer, or as soon as the leaves begin to decay. Let them be spread out to dry on boards in some airy situation.

SKIRRET.

(*Sium sisarum.*)

The common skirret is a perennial, tap-rooted plant, a native of China. The tubers have an agreeable aromatic flavor, and abound with saccharine particles. They are boiled, and served up with butter in a similar manner as the parsnip.

The seed may be sown at the period of the flowering of the peach, in drills a quarter of an inch deep and twelve inches apart. The culture in other respects is like that of the parsnip. It may also be cultivated by offsets thrown off by the old roots in the spring.

SPINACH, OR SPINAGE.

(*Spinacia oleracia.*)

Spinach is a very hardy annual, with thick, succulent leaves, cultivated to considerable extent for greens. For the early spring crop, sow about the middle of autumn, thinly, in fourteen-inch drills; and at the approach of winter, cover with a light layer of straw or cedar branches. For the succeeding spring and summer crop, sow as early in the spring as the ground can be put in good condition. To grow

spinach in perfection, the ground must be made very rich with strong manure.

Round-leaved Savoy.—Has smooth seed, and round or blunt, thick, fleshy leaves, a little crimped; generally preferred for spring sowing. There is also a round-seeded variety, with longer, arrow-shaped leaves, which is by some considered the best.

Prickly or Fall.—This is the hardiest variety; prickly-seeded, with triangular, oblong, or arrow-shaped leaves. It is mostly employed for the fall sowing.

Flanders.—A productive variety, with large broad leaves; seed, round; quite hardy.

Lettuce-leaved.—A new sort of very superior quality; leaves, large, thick, and deep green; seed, round; best suited for spring sowing.

SPINACH, NEW ZEALAND.

(Tetragonia expansa.)

This plant grows very large and luxuriant in warm, rich soil. It will endure severe drought, which is its greatest advantage, and produces a large quantity of leaves during summer. The plants should stand two or three feet apart.

SQUASH.

(Cucurbita melo-pepo.)

Squashes are natives of warm latitudes, and may be divided into "Summer" and "Winter," "Bush" and "Running" varieties. Being all very tender and sensitive of cold, they cannot with safety be planted in the open ground before the middle of spring. The hills should be manured and prepared the same as for cucumbers, and all sorts thinned to two or three plants in a hill.

Early Yellow Bush Scolloped.—An early, flat, scollop-shaped variety, of a deep orange yellow, and smooth skin; used when young and tender for boiling, and at maturity for making pies.

Early White Bush Scolloped.—Similar in shape to the Yellow, light cream-colored. It grows to larger size, of a coarser quality, and is a little later; more grown at the South than any of the others. Both varieties are called "Patty-pan" in the Middle States, where all the summer sorts have the local name of "Cymlings."

Early Bush Summer Crooknecked.—The richest and best sort for summer; very early and productive. It is small, crooked-necked; covered with warty excrescences (the more warty the better;) color, bright yellow; shell, very hard, when ripe. It is used only when young and tender, which may be known by the pressure of the thumb-nail through the rind. These three sorts should be planted three feet apart. There are Yellow, White, and Green running varieties of nearly the same shape, but they take up too much room to be allowed a place in a common garden.

Green Striped Bergen.—This is cultivated to considerable extent for the New York market. It is small, bell-shaped, and striped with dark green and white; a bushy variety of strong growth, requiring to be planted four feet apart. Used both green and ripe. It does not produce great crops, but is quite sure to ripen in the coldest seasons.

Vegetable Marrow.—This is intermediate between the pumpkin and squash; used mostly when young and tender, like the summer squashes, but is inferior to any of them. Fruit, long-oval, very fleshy and succulent; color, light yellow. There are different colored varieties. Plant six feet apart, on account of its running habit.

Fall or Winter Crooknecked.—The kind most generally cultivated in New England, for fall and winter; neck, long and solid; color, pale yellow—the deeper the color the better. There is a striped variety of the same shape and quality, with which this is usually mixed. It yields well, and is excellent for pies; valuable also as a farm crop for feeding cattle and hogs. It is called "Cuckaw" in the Middle and Southern States.

Canada Crooknecked.—Is a small, early variety of the above, that bears well, and is by many esteemed preferable. From their running habit, the last two require to be planted six feet apart.

Autumnal Marrow.—This is the most popular kind in the Boston market. Form, ovate, pointed; rind extremely thin, bright orange or salmon-colored; flesh, deep orange, finely grained, and excellent flavored; seeds, large, white. Average weight, six or eight pounds. It keeps well in winter, and will boil as dry as a potato. Plant eight feet apart.

Lima Coco-nut.—A large, long, blue squash, very fine grained, and sweet; seeds, white; very late, but if well ripened will keep till spring; esteemed for boiling dry. Plant eight feet apart, and leave but two plants in a hill.

The varieties of the squash are so numerous, and they intermix so easily, that it is very difficult to preserve each pure. The rage for "Mammoth squashes" it is hoped has gone by; they are always coarse-grained and watery, only fit for stock-feeding. Small and medium-sized squashes are uniformly finer grained and richer flavored.

TANSEY.

(Tanacetum vulgare.)

This plant, although originally introduced as a garden plant, and has now become indigenous in the older-settled parts of the country, is still worthy of cultivation in the new States. It is a prominent article in popular materia medica, and has its use in domestic economy.

The plant is perennial, and is easily propagated by seed, and also by partings of the roots. By the former, it should be sown in the spring, in any light soil. When increased by its roots, it may be planted any time in the fall or spring, and even in summer if freely watered.

TANYAH.

(Caladium exculentum.)

A tender perennial, producing large tuberous roots, replete with starch, and is important in affording nutriment to many nations. It is cultivated in the West Indies, Brazil, and the Canary Islands, as well as in the Carolinas, and other parts of the South.

This plant succeeds best in a rich, lumpy soil, and requires an abundance of water. It may be propagated by cuttings and divisions of the roots, planted in rows from two to two and a half feet apart, and a foot asunder along the rows. It requires but little care in cultivation other than earth-stirring, and watering frequently should there be no rain. It will keep longer and as sweet as the potato.

TARRAGON.

(Artemisia dracunculus.)

A well-known perennial, used in salads to correct the coldness of the other herbs; and its leaves are excellent when pickled.

This plant requires a poor, dry soil to produce it in perfection and hardiness. It may be propagated by partings of the roots. To have it green during the winter and spring, strong-rooted plants must be made use of, small portions at a time, during the fall or early winter, as long as the ground is sufficiently open. For the main crop, it may be planted during the spring. The plants should be set ten inches apart, and if dry weather ensue, water must be given regularly every evening until they are rooted. They soon establish themselves, and may be used the same year. As they run up, the stems should be cut down, which will cause them to shoot afresh. At the end of autumn, in the Middle States, if some established plants are set beneath a south fence, they will often afford leaves throughout the winter, or, at all events, come early in the spring. Some of the leaves should be gathered in the summer and dried for winter use.

THYME.

(Thymus vulgaris.)

The young leaves and tops of this plant are used in soups, stuffings, and sauces. The two principal varieties are the "Broad-leaved" and the "Narrow-leaved;" but the former is generally preferred.

This plant is best raised from seed, and may be sown, as early in the spring as the season will admit, in a bed or border of light, fine earth, either thinly broadcast, or in small, shallow drills, six inches apart, slightly covered. The after-culture is similar to that of other sweet herbs.

TOMATO.

(Solanum lycopersicum.)

The tomato, until within the last twenty years, was almost wholly unknown in this country as an esculent vegetable, and only to be found in borders and flower gardens, for ornament or curiosity, under the name of "Love apple." Since its introduction to the uses of the table, and the discovery of its exceedingly wholesome properties, it has been rapidly gaining favor, and is now one of the most common of all culinary vegetables. It is extensively grown near the large markets, where its high price early in the season is a great inducement to gardeners to undertake to produce an early crop.

Sow very early in the spring, in window pots, for the want of a hot-bed, and in the open ground, as soon as it can be worked, in a warm

border on the south side of a tight fence, and thin the plants to three or four inches, to keep them low and stocky. When severe frosts are no longer to be feared, transplant to two by three feet apart. Hoe often, and earth up a little till the plants are a foot high; they may then be supplied with supports, or allowed to spread upon the ground.

To hasten the maturity of the first fruit which sets, pinch off the extremities of the tops and all the secondary shoots which afterwards appear above the flowers. When the desired number are about half grown, commence stripping off the leaves, cutting off the new shoots, so that at length the plants may be completely bared of their leaves, and the fruit left fully exposed to the sun.

The following is a new French mode of preserving tomatoes for several months: "It consists in gathering at a late period the fruit which has reached its full size, but which is yet green. Leave eight or ten inches of the stalk, and tie them in bunches of six or eight, taking away most of the leaves. These bunches are afterwards hung in an airy and dark place, where they will keep all winter. When it is required to use them, take the necessary number of bunches, and place them near the windows of a living-room. The fruit reddens and ripens in a few days."

Large Red.—The earliest that grows to large size; color, bright red; shape, uneven and deeply furrowed. A great bearer.

Large Smooth or Round Red.—A little later than the above, smooth and fair, nearly round or flattened; color, bright red. It is preferable only for its beauty and cooking facility.

Pear-shaped is preferred for pickling, being more fleshy and firm; color, reddish pink.

Large Yellow.—About the size and shape, but a little more flat than the Smooth Red; color, bright yellow; flesh, firm; fit only for preserving.

Small Yellow.—Shape, uniformly oval, and perfectly smooth; color, lemon-yellow; used only for preserves.

Cherry.—A small round red tomato, of the shape and size of cherries; cultivated mostly for pickling. It is the earliest of all.

TRUFFLE, PIEDMONTESE.

(Tuber magnatum.)

That class of fungi known by the name of truffle has not yet been much, if any, cultivated in the United States. It has not yet succeeded either in England or France, though the Prussians have introduced it as a tenant of the garden, and Count de Borch has been equally successful in Italy. The latter cultivates the Piedmont truffle by the following process: He either employs the soil where the truffle is found, or prepares an artificial one of seven parts good garden earth, two parts well pulverized clayey soil, and one part oak sawdust, mixing them intimately together. Decayed oak or beech leaves would probably be better than the sawdust. Where the natural soil is used, he trenched it two feet deep, removing all the large stones, and adding oak sawdust, and about one-tenth of powdered snail-shells where the soil was too stiff. Choosing an aspect rather exposed to the north

than to the south, where no reflected rays could fall upon it, with every precaution to insure its being thoroughly soaked with pure rain-water; and after waiting a day or two, until it was in a proper state of moisture, he made rows half a foot deep, and in these, at six inches distance, placed good and sound truffles, each of them being surrounded with two or three handfuls of oak sawdust, taking care to mark the rows accurately. Ridges were then made over each row, to prevent the truffles from being injured by too abundant moisture, and the bed left until the following autumn, with no other precaution than, in dry weather, to take care that they did not become too dry. The result, it is stated, was an abundant harvest every year from October to January.

Although truffles have been the favorite dish of epicures from time immemorial, yet, strange to say, they have always been scarce and high-priced, few knowing how to raise them, and fewer still possessed of the proper knowledge to prepare them for the table. It has been stated that truffles which are in a state of decay and unfit for the table, planted under the shade and drip of trees, have succeeded in growing. It is also said that, of all trees, the cedar of Lebanon is the most favorable to the growth of the truffle.

TURNIP.

(Brassica rapa.)

This wholesome and agreeable esculent has been cultivated from time immemorial as a field crop, and in England, at the present day, it is one of the staple productions of the farm. It is most easily affected in its form and flavor by soil, climate, and mode of culture. There are a great number of varieties, but the following are the best for the garden or the farm:

Early Flat Dutch or Spring.—A medium-sized, white, flat turnip, of quick growth, juicy, and of excellent quality, when young; sown in spring or fall. It is spongy and inferior when overgrown.

Strap-leaved White-topped is a very early sort, which is taking the place of the old Early Dutch; form, round, flat, medium size; very small tops, with but few leaves, entire, upright growth, more resembling horse-radish leaves in shape; tap-root, very small. It is also one of the very best for fall sowing, and for market.

Strap-leaved Red-topped has the form and character of the White-topped, excepting color, which is red or purple above ground. These two kinds are the best for spring sowing, and for all garden culture, where they may be grown fair and free from worms, if not sown too early in the fall. They have been introduced but a few years, and are rapidly taking the place of all other flat turnips for table use. Flesh, fine-grained and exceedingly rich, buttery-flavored.

Early Garden Stone.—This is an English garden variety, of a round shape, firm texture, with larger leaves than the Early Dutch, but not so well adapted for spring sowing. It is of quick growth when sown in the fall.

Early Red-topped Flat.—A handsome flat-shaped root, purple above ground, with a small top and tap-root. An excellent variety, differing

but little in shape from the Strap-leaved, except in the form of the leaf, though not of so fine quality.

Large English Norfolk.—This is a large variety of the flat turnip, rather irregular in shape, with large tops; color, white. It is grown principally for stock-feeding, and requires to be sown earlier than the table sorts. It is allowed to stand out during the winter at the South and West, where the tops are used for greens.

Large White Globe, of the most perfect globe-shape; skin, white and smooth; leaves, dark green. A strong and uniform grower, larger than the Norfolk, and suitable only for field culture.

Long White or Cow's-horn.—This excellent variety has never become extensively known. It grows very quickly to good size, nearly carrot-shaped, and stands half out of ground; flesh, white, fine-grained, and sweet; tops, small and spreading. It keeps well, and is esteemed by some the very best of all for culinary purposes; but it should be gathered before very severe frosts, or it may be injured for keeping. It ought to be in general cultivation.

Long Tankard.—An English variety; thick, long, white, growing one-third or more its length out of ground. There are Green and Red-topped Tankard turnips of the same shape. They are of softer texture than the flat varieties, and more exposed to injury by frost.

Early Yellow Dutch.—A very handsome variety, of a smooth, round form, and small top; flesh, yellow, firm, sweet, and excellent flavored. It keeps well, and is altogether the best yellow turnip for the garden.

Yellow Stone, a very hard, round, yellow turnip, green above ground; top, small; excellent to keep.

Yellow Aberdeen or Bullock.—Roots, medium size, round form, with comparatively short, spreading, dark-green leaves. It is an old and esteemed variety, considered as approaching very nearly to the Ruta-Baga in hardness and firmness of texture.

Long Yellow.—Long, carrot-shaped, deep yellow, growing entirely in the ground; flesh, close-grained and hard; best kept till spring.

Robertson's Golden Ball or Orange Jelly.—This sort, lately introduced, is of quick growth. It forms a beautiful bulb, with a bright yellow rind, and cream-colored flesh, rich, pulpy, and excellent for culinary use.

Dale's Hybrid.—This variety was obtained by intermixture with the Swedish turnip. Roots large, and rather oblong; irregular shape, of a lightish yellow color, and firm texture; tops, large and luxuriant. It originated in Scotland.

For the spring crop, sow the Early White Dutch or the "Strap-leaved" sorts, as early as the seed can be got into the ground, in fourteen-inch drills, and thin to five or six inches. Keep them perfectly clear from weeds, and when the bottoms begin to enlarge brush away the earth from about the roots to the depth of half an inch or more, and give them a light dressing of wood-ashes. This is the surest mode of obtaining fair and smooth spring turnips in old gardens, where they are almost certain to grow wormy if the earth is allowed to remain in contact with the roots. It is important to get them started very early, so that they may have time to grow of a sufficient size before very hot weather, when they will soon become tough and strong. They may

be sown in a seed-bed or on a warm border, and transplanted in a wet time to the drills, when they have made five or six leaves, taking care to shade and thoroughly water the plants. On fresh, new land, a fine spring crop may occasionally be obtained by the ordinary mode of culture.

For the fall and main crop, sow, in New England, from the last of July to the first of August, in drills, as directed for the spring sowing. In the field, turnips are more generally sown broadcast, though much the largest crops are obtained by drill culture.

Land newly cleared and burnt over, and old pasture-ground, ploughed two or three times during the summer, and well manured and ashed at the time of sowing, will produce the clearest and sweetest turnips. The sowing should always be done just before a rain, if possible, for the escape from the fly, and the success of the crop in great measure depends upon quick germination, and a rapid and free growth at first. They will be safe from the fly after putting out the rough leaf. A light sandy or gravelly loam, freshly manured, is the most suitable.

To preserve turnips in good order for winter, store them in barrels placed along-side the wall of a cool cellar, and cover them with sand or turf to keep them fresh.

The tops afford excellent spring greens, in a mild climate, where the roots can stand out with safety through the winter.

The Ruta Baga, "Yellow Swedish" or "Russia," known to many people by the name of "French Turnip," and in New York market by the name of "Southold Turnip," forms a distinct class, which, perhaps, more properly belongs to the cabbage tribe. They are close-grained, very hard, and will endure a considerable degree of cold without injury. They keep well, stored in a cellar, without any trouble, but are not in perfection for the table till towards spring. Extensively grown for a farm crop. Sow at the North from the 20th of June to the 1st of July, in twenty-five inch drills, and thin to ten inches apart. It is necessary that the ground should be dry, and made very rich.

Purple-topped.—This is the variety mostly grown; shape, oblong; dull reddish color above ground, and yellowish underneath. It is harder than any of the common turnips, and will keep solid till spring. The "Green-topped" is like it, excepting in color.

Skirving's Liverpool, an improved purple-topped variety, of very strong growth and large size. By its quick vegetation, it generally escapes the ravages of the fly; best suited to field culture and cattle-feeding.

Laing's Improved.—The handsomest variety known, and of excellent quality; purple above, and yellow under ground; almost perfect globe-shaped when well grown, with a small top and tap-root. The leaves have a peculiar horizontal growth.

Early Stubble Swede, a very quick-growing variety, suitable for late sowing. It makes a handsome round root with a green top, nearly as early as the white turnips.

White French.—This grows very similar to the Ruta Baga, but

generally is less smooth and handsome; flesh, white, and of excellent taste in winter and spring.

WORMWOOD.

(*Artemisia absinthium.*)

A hardy perennial, used as a tonic, bitter, and aromatic medicine, from remote ages. It may be propagated by cuttings or divisions of the roots, as well as from seeds. The former may be planted from spring till autumn in a sandy loam, well drained. The seeds may be sown soon after they are ripe.

YAM, CHINESE.

(*Dioscorea batatas.*)

A yam of recent introduction from China seems particularly worthy of a place in the kitchen garden, on account of its perfectly feculent flavor and the absence of any after-taste of sweetness, acidity, or spiciness. The cultivation of this yam appears to be easy and simple, and will be found in detail at page 171 of this Report.

This root it will be seen is voluminous, rich in nutritive matter, and can be cooked in every respect like the common potato, and even be eaten in a raw state.

YAM, COMMON.

(*Dioscorea sativa.*)

A climbing annual, cultivated in the tropics, also in the Southern States of the Union, for its large, flattened, and sometimes palmated roots, which are boiled, roasted, and eaten like the potato. They are both wholesome and nutritious as well as palatable. Their flour, or farina, also, is used for puddings and bread. The cultivation is the same as that of the sweet potato, except that a stake or pole is driven into the ground near the plant to allow the vine to climb.

Another species (*D. alata*) is also cultivated, the roots of which are sometimes three feet in length, often weighing 30 pounds each. Of both kinds, there are numerous varieties.

LANDSCAPE GARDENING.

Landscape gardening, as its name implies, is a composition of beautiful scenery, so that all artifice is concealed by the blending of trees, shrubs, flowers, grass, land, and water—thus forming vistas as gratifying, or more so, if possible, as those which occur naturally. Admiration for such scenery is an innate quality of the human mind; and to imitate it successfully, not only requires much study, but correct judgment and taste. "Consult the genius of the place," is an axiom which has been derided by some, but which is dictated by the soundest sense. In general, it is not possible to introduce any desired landscape beauty upon a given plot of ground without a heavy outlay; for the effect produced by an even surface is otherwise quite unattainable upon one that is broken and abrupt.

Under this general head, there is not space enough, in a volume like the present, to enter fully into its details. Therefore, only a few hints are here thrown out, which may serve as an apology until a more favorable opportunity offers to treat on the subject more at length.

LAWNS.

A lawn is a surface of turf, or green-sward, in the vicinity of a house, requiring to be kept smooth by a regular application of manuring, by top-dressing or otherwise, the roller, and the scythe. It differs from a "grass-plot," with which it is often confounded, which consists of a parterre, or bed of flowers, arranged with a grassy turf between them instead of gravel. Again, it should not be confounded with a "pleasure-ground," which, properly speaking, is a collective name for a combination of parterres, lawns, shrubberies, waters, arbors, &c. Of these, one observation may be applied to all—"Let congruity preside over the whole." It is a great fault to have any one of those portions of the pleasure-ground in excess; and let the whole be proportioned to the residence. It is quite as objectionable to be "over-gardened" as to be "over-housed."

When first constructed and graded, after the ground has been dug over, as even as may be, the lawn must be rolled, the hollows filled up, and this repeated until a uniform surface is obtained. It must then be properly prepared, and the sod, or turf, laid or sown with grass. If the former mode can be adopted, it is the best, as the turf is obtained at once from fields, road-sides, commons, &c., and is more regular than can be produced under the best circumstances from seed. In the Middle or Northern States, the season for laying turf, if the ground be open, is any time from September till May or June, though it will grow at almost any period of the summer. It should be watered frequently, should there not be rain. The turf for this use, when professionally done, is cut with an instrument called a "turfing-iron;" but ordinarily it may be done with a shovel or spade. The pieces of turf should all be cut of an equal width, length, and thickness. A proper size is a foot wide, a yard long, and about an inch thick. They should be first marked by a line of the proper width, length, and depth, with an instrument called a "racer," or "rutter"—racing them first lengthwise a foot wide, then across in yard lengths. The next thing to be done is to cut them up, having particular regard to have them level and equal in thickness; otherwise it would be difficult to lay them even. As they are cut, a man or boy may roll up the turves, close and tight, with the grass-side inward, and pile them up by tens, especially if they are cut by the hundred. A man will cut from three hundred to seven hundred in a day, or even more, if a very soft and easy-cutting turf, and having a person to race them out and roll them up as they are cut.

All the preparation the soil requires is, to dig it even, a spade deep, provided the sub-soil is open, and to have all large stones removed from the surface. Then reduce the surface to perfect uniformity by repeated rollings, and filling up the hollows when necessary. The surface being then loosened by raking, is ready for the seed or turves. The latter are to be laid regularly turf by turf, unrolling them as they

are laid, joining them up quite close, edge to edge, making good all deficiencies and broken parts as the work progresses; and as soon as laid, they should be well consolidated with broad, heavy wooden beaters, made of flat pieces of oak plank, two inches thick, fifteen or eighteen inches long, and a foot broad, having a long handle fixed slanting in the middle of the upper side. With these, beat regularly all over, and roll well with a heavy roller, observing that the beating and rolling should be repeated in moist weather. If very dry, hot weather succeeds, so as to occasion the turf to shrink and open at the joints, a good watering will be of much advantage. It may here be remarked, that in very dry weather, all lawns should be watered; and if a little guano and muriate of lime be dissolved in the water, it will keep the surface gently moist and the turf green.

If turves are scarce, they can be increased by inoculation, by cutting them into pieces about three inches square, and planting them green-side up, pretty thickly, over the space intended for the lawn. Let them be beaten down into the soil and freely watered, frequently rolling and watering also in dry weather. In a few months, the turf will be as close and the sward as perfect as if the ground had been entirely turfed.

Mounds, banks, and sloping grounds, so steep that waterings would carry off the soil and seed, cannot be sown. In such cases, the turves should be cut somewhat thicker than named above, and carefully laid edge to edge over the slopes, taking care to place them alternately in such a manner as effectually to "break joints," after which a good watering is necessary to cause them to adhere to the soil. Sodding done in this way, has been known to stand well at an elevation of 60°. In speaking of slopes, covered with turved grass and loose sand, it may be remarked that 5° indicates a considerable inclination. For instance, in France, the high roads must not exceed 4° 46′ by law; in England 4°, or one foot rise in thirty-five. A slope of 15° is extremely steep, and one down which one cannot descend in a carriage. A slope of 37° is almost inaccessible on foot, if the bottom be a naked rock or a turf too thick to form steps. The body falls backwards when the tibia makes a smaller angle than 43° with the sole of the foot—42° being the steepest slope that can be climbed on foot in a ground that is sandy. When the slope is 44°, it is almost impossible to scale it, though the ground permits the forming of steps by thrusting in the feet. A slope of 55° to man is quite inaccessible.

The formation of a lawn by sowing requires some attention; but with due precaution and an appropriate choice of the species of grass, it is easy to cause to grow an excellent green turf upon any soil wherever a garden would exist. The grasses must be varied according to the nature of the soil; and at present, I know of no more judicious selections than the following, which have been recommended in Scotland. These, however, it is presumed, will answer only for the Middle and Northern States. Should they not succeed in other parts of the Union, the only resource is to resort to native and other species which time and experience only can test:

	Quantity for light soils.	For medium soils.	For heavy soils.
	Lbs.	*Lbs.*	*Lbs.*
Avena flavescens, (*Yellowish oat-grass*)	1	0	0
Cynosurus cristatus, (*Crested dogs' tail*)	5	6	7
Festuca duriuscula, (*Hardish fescue*)	3	3	4
Festuca tenuifolia, (*Fine-leaved fescue*)	2	2	1
Lolium perenne tenue, (*Fine ray-grass*)	20	20	20
Poa nemoralis, (*Wood meadow-grass*)	1½	1¾	2
Poa nemoralis sempervirens, (*Evergreen meadow-grass*)	1½	1¾	2
Poa trivialis, (*Rough stalked meadow-grass*)	1½	1¾	2
Trifolium repens, (*White clover*)	7	7	7
Trifolium minus, (*Small yellow clover*)	2	2	1

The above mixtures are enough for an acre. Where the ground is overshadowed with trees, both kinds of festuca should be omitted, and similar quantities of the two kinds of Poa nemoralis be substituted.

In France, according to M. Vilmorin, Lolium perenne is that most generally employed for sowing lawns. The quantity used is about 100 pounds to the acre. In small plots or enclosures, where a thick fine turf is required, the quantity is doubled; but from experience it has been observed, that the thicker the grass, the less it resists drought, which probably is owing to the roots not penetrating sufficiently deep into the earth. Ray-grass appears to be admirably adapted to a deep, rich soil, provided it is constantly watered by artificial irrigation or by rain. When the ground is dry, sandy, or only covered with a thin stratum of soil, this grass dries up and perishes in summer; but there are other species which, when mixed, result much better—such as common meadow-broom (*Bromus pratensis*); smooth-stalked meadow-grass (*Poa pratensis*); red hardish fescue (*Festuca duriuscula vel rubra*); sheep's fescue (*Festuca ovina*); crested dogs' tail (*Cynosurus cristatus*); sweet-scented vernal grass, (*Anthoxanthum odoratum*), and creeping white clover (*Trifolium repens.*)

In the park at Fontainbleau, beautiful lawns have been formed over almost pure white sand by means of sheep's fescue, mixed with ray-grass, which, however, disappears after the first year, and leaves the former alone. The common meadow-broom makes an excellent turf over a dry, calcareous soil, where no other grass would resist the drought. A good turf may also be obtained in open woods, provided the trees are pruned high enough to allow of a free circulation of air, and that the tops are not too thick. The best kinds for this purpose are the red hardish fescue, sweet-scented vernal grass, narrow-leaved wood meadow-grass (*Poa nemoralis vel angustifolia.*) If the place is very dry and shady, the two following may be added: various-leaved fescue, (*Festuca heterophylla,*) and the slender-leaved fescue (*Festuca tenuifolia.*) As these grasses are of slow growth, it is better to mix ray-grass with them, as it makes an early show and then gives way for the others. These festucas, it may be remarked, have the disadvantage of forming isolated tufts.

The time for sowing lawns is in spring or autumn. But where a large amount of dry land is to be sown, the beginning of autumn is regarded as the best; although for small parcels or strips of ground, which can easily be watered, almost any period of the year will suit. Sow broadcast, and as uniformly as possible, slightly covering the seed with a sprinkling of vegetable earth, and, if practicable, roll it well.

A lawn once established, should never be neglected; with constant care, it will last a long time; if abandoned to itself, it will be necessary, in a few years, to make it anew. In its management, it requires to be weeded in spring, and again in the beginning of autumn, in order to get rid of strong-rooted and large-leaved plants—such as sorrel, plantain, lucerne, &c., which naturally may have sprung up, or have been brought there by manures. The grass should be mown often enough to prevent it from coming to seed, and the ground rolled after every mowing. It should be top-dressed in autumn, either with long manure, raking off the straw in the spring before the grass begins to grow, or with a mixture of guano and soot. A sprinkling of vegetable earth is the best fertilizer that can be applied to a strong soil. This operation should be repeated once in three years. When a lawn, from age, becomes filled with moss, its surface should be loosened several times in autumn with an iron rake, in order to tear it up. Notwithstanding the grass will appear to be much disturbed, it will not suffer from the operation. Should there be any vacant or exposed places, let them be sown with grass, covering them with a thin sprinkling of vegetable earth. Small lawns should be improved by re-sowing every year, in order to keep them thick and fresh.

LIVE FENCES.

PLANTING AND MANAGEMENT OF QUICKSET HEDGES.

Hedging, in various parts of the Old World, has been a favorite mode of enclosure from remote antiquity, and has neither lost its interest nor its utility by the tardy lapse of time. Indeed, it forms, up to the present, an essential feature in the European landscape, particularly in Germany and England, where the utmost attention is paid to it in fencing their fields. It was practised by the ancient Romans, as well as by the Greeks, as appears from Homer in his "Odyssey:" When Ulysses returned from Troy to his father Laertes, after many years' absence, the good old man had sent his servants into the woods to gather young thorns for forming hedges, and while occupying himself in preparing ground to receive them, his son asked him, "Why, being now so far advanced in years, he would put himself to the fatigue and labor of planting that which he was never likely to enjoy." Laertes, taking him for a stranger, gently replied: "I plant against my son Ulysses comes home." The thorns, to which the allusion is made,

might have been the common hawthorn, or some Oriental species of cratægus or some other thorn-bearing plant. Varro calls a thorn hedge "a natural and living guardian;" and Columella prefers it before the constructed or "dead hedge," as being more lasting and less expensive.

In more modern times, we find, from Cresentius, that hawthorn hedges were used in Italy before the year 1400. In England, they appear to have been in use from the time of the Romans. In all the old works on husbandry, directions occur for quicksetting ditches and forming hedge-rows. Standish, in his "Commons Complaint," published in 1611, gives directions for a new method of pruning "quick-wood sets of white thorne," so as to make them thick at bottom; and advises, in certain cases, that "three rows of quickthornes" shall be set in each ridge, instead of two, as appears to have been the ordinary practice. In a black-letter tract called "An Olde Thrifte newly revived," &c., published in 1612, very particular directions are given for enclosing young plantations "with a good ditch and quickset of white thorne, crab-tree, and hollin, mixed together, or else any one of them (and by no means, if you can chuse, set any black thorne amongst it, for that will grow into the fields ward, and spoyle pasture, and teare the wool of the sheepes backe"!) In Tusser's "Five Hundred Points of Good Husbandry," directions are also given for making hedges:

"Go plough or delve up, advised with skill,
The breadth of a ridge, and the length as you will,
Where speedy quickset for a fence you will draw,
To sow in the seed of the bramble and haw."

Most of these hedges, however, appear to have been made to enclose plantations of trees, and hedges of hawthorns; for fields probably were not in use in England before the establishment of nurseries, about the beginning of the seventeenth century. The first planted hedges in any country would doubtless consist of shrubs, transplanted from the neighboring woods; and those which appeared the most formidable from their thorns, or spines. But this, doubtless, would give rise to hedges formed of different plants. For instance, in some parts of England, the sloe, or black thorn, *(Prunus spinosa,)* might prevail; while in others, the hawthorn, *(Cratægus oxyacantha.)* or the buckthorn, *(Rhamnus catharticus,)* might have had a preference. In all of these hedges, there must necessarily have been a mixture of species, from the difficulty of obtaining a sufficient number of one kind without sowing the seed.

From the success attending the hawthorn and buckthorn for hedges in Europe, early attempts were made to adopt them in the older-settled parts of the United States; but in most instances, they have proved inefficient, if not an entire failure, owing to the excessive droughts which often prevail here, as well as to the intense heat of our summer sun. The buckthorn, in several instances, when sufficient attention was paid to the selection and preparation of the soil and to the use of the shears, has been formed into beautiful hedges, which bid fair to resist our climate, and endure for many years. The "Washington Thorn" (*Cratægus cordata*) was also brought into notice as a hedge plant towards the close of the last century, and was subsequently employed for that pur-

pose in various sections of the Union; but, owing to improper management, and the tendency to disarm itself of its spines after a certain age, it has been discontinued. Similar results have attended the adoption of other species of thorny trees and shrubs in this country, with the exception of the "Osage Orange," the "Spanish Bayonet," and the "Cherokee Rose." These are all natives, and remind us of the importance of experimenting more extensively with other indigenous plants with the view of growing live fence.

GENERAL REMARKS ON THE FORMATION AND TREATMENT OF HEDGES.

In the formation of a quickset hedge, the main things to be considered are, the nature of the land, whether wet or dry; the preparation of the ground; what kinds of plants will thrive best in the soil, whether it be clay, loam, peat, gravel, or sand; the nature of the soil whence the plants are to be removed; the character of the roots of the plants, whether they creep near the surface or penetrate deep into the earth; the age and size of the sets; and the modes and seasons of planting, pruning, repairing, &c. If the land be low, moist, or wet, it must either be ditched or drained, or planted with willows or other aquatic shrubs; if it be moderately moist or dry, the plants may be set on the embankment of a ditch, or on the plain surface of the ground, without a ditch. Those plants which are raised in a nursery are to be preferred to all others, and if produced on a spot near the place, it will be best. As a general rule, the better the ground is prepared, the sooner the hedge will arrive at maturity, and the longer will be its duration. Again, the modes of planting and pruning, as well as the soil, manure, situation, temperature, &c., should be varied to suit the nature of the plant; and, on the contrary, the plants should be selected and treated in reference to the condition of the climate, situation, and soil. And in no case should a hedge be formed where any other kind of fence can be made cheaper, whether it be composed of iron, wood, or stone, always taking into account its durability, as well as its first cost.

In the management of live fences of every description, an important point to be considered is, to keep them dense near the ground, and as impervious as possible to wind and animals; for which purpose the transverse section of the hedge should be made broader at the base than at the top, in order that the exterior leaves of the plants may receive in an equal degree the full influence of light, air, and perpendicular rains. But let it be remembered that, notwithstanding it takes time to form a good hedge, it makes the cheapest fence in the end, particularly in parts of the country where other fencing materials are costly or scarce. The ground occupied by a hedge on a farm is not available either for grazing or tillage, and the farmer, therefore, in forming his fences, where land is costly, should be careful to have as little land thus occupied as possible. The larger the enclosures the less will be the waste of ground, and a straight fence will occupy less room than one which is crooked. In the ploughing of a field, moreover, there will be a material saving of time and labor, and the work will be better done, if the fences are straight; and if there is a good length of furrow, there will also be required fewer turns of the team.

In respect to the training and general culture of hedges, in general, it may be observed that all such as are liable to be eaten by cattle must be fenced until the plants are fully trained. For the first two years, the hedges must be kept free of weeds; and if it is designed to train them in proper form, close and neat, they must be clipped both on the sides and tops, once or twice a year, but never less than once, say from the last of June to the end of August. They should always be clipped into a conical or elliptical form, as the diminution of the branches towards the top increases the development of the plants at the bottom, in consequence of the greater elaboration of the sap in those parts and the free admission of air, light, and rain.

TREES AND SHRUBS USUALLY EMPLOYED FOR HEDGES.

The trees and shrubs, which have been adopted in Europe or in this country for ornamental hedges in gardens or for enclosing fields, include the following sorts. Although many of them may not be adapted to our economy, soil or climate, the hints herein given may be the means of suggesting ideas in experimenting with similar or analogous native plants, of which we have a great variety. The chief point to be arrived at is to find such as are hardy, dense, or spiny, and rapid in their growth, which will not extend their roots nor suckers in a manner that will interfere with the crops in the adjoining enclosures, and those that will form an efficient barrier, without repairing for years:

EVERGREENS.

ALATERNUS, NARROW-LEAVED.

(*Rhamnus alaternus angustifolia.*)

A dense, hardy evergreen shrub, native of the south of Europe, growing to a height of 15 or 20 feet. From the rapidity of its growth in almost any soil and situation, it is particularly valuable for an ornamental hedge, for concealing unsightly objects; and it may also be clipped, by the aid of the shears, into almost any form.

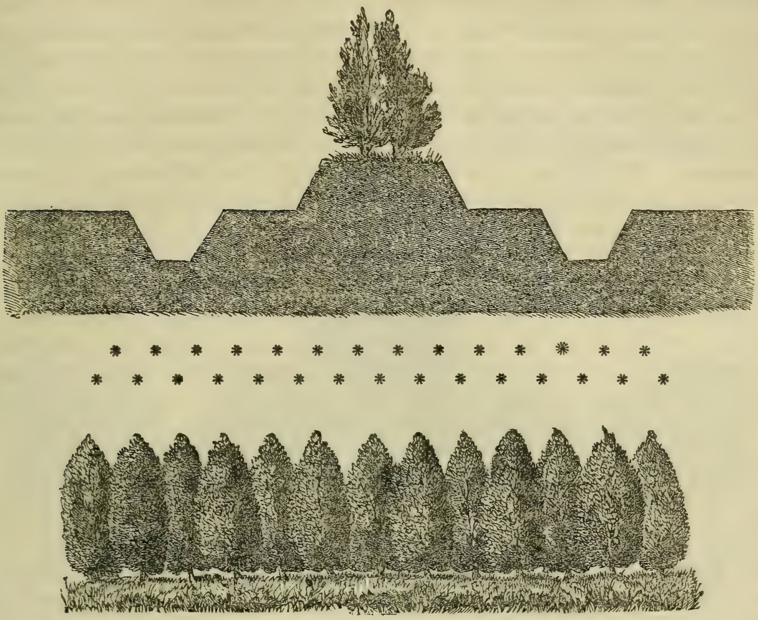
This plant was formerly much cultivated in Europe to form hedges for enclosures; but its branches were found to be too pliant for this purpose, being frequently displaced by strong winds; they also shoot very irregularly and thin, so that the middle of the hedge is frequently open and wide, and only the sides can be kept tolerably close. If we add to this its being frequently laid or broken down by snow in the winter, it must be deemed an improper plant for this purpose.

ARBOR VITÆ.

(*Thuja occidentalis.*)

This species of thuja, the only one discovered in America, is particularly valuable for an evergreen hedge, not only on account of its hardiness and wide geographical range, but from the beauty of its foliage and compactness of growth, which render it well adapted to conceal unsightly objects, and as a shelter for gardens and nursery

grounds exposed to chilling winds. It bears the knife well, and also the shears.



The young shrubs may be planted alternately in two rows from 20 to 24 inches apart on a ridge of earth slightly elevated above the common level of the ground, or on an embankment with one or two ditches, as indicated in the diagram above. The branches of one row will entwine themselves with those of the other, and form a thick tufted mass, which should be constantly kept clipped in order to preserve uniformity. When first planted, the young trees may appear to be too far apart, leaving spaces wide enough to admit small animals; but in the course of a few years, their stems will increase in thickness, and form as complete a barrier as the holly or broom.

THE EVERGREEN BOX.

(*Buxus sempervirens.*)

This tree appears to have been much employed in verdant sculpture, and close-clipped hedges in the gardens of Roman villas in the Augustan age. Pliny describes his Tusculan villa as having a lawn adorned with figures of animals cut out in box-trees, answering alternately to one another. In another part of the same villa, the box is mentioned as being cut into a variety of shapes and letters; some expressing the name of the master, and others that of the artificer, &c. The same practice is followed in several Roman gardens at the present day; for instance, in that of the Vatican, the name of the Pope and the date of his election may be read from the windows of the Palace in letters of box.

The box may be propagated by layers, either in spring or autumn, both of the young and old wood. When the plants have attained a sufficient size, they may be planted in the hedge-rows in double, alternate lines from 10 to 12 inches apart. They may be clipped at almost any season except mid-winter; but June is considered the most appropriate time for this operation, when the plants have nearly completed their year's growth; because they will afterwards make shoots from half an inch to an inch in length, or, at all events, put forth new leaves, and thus, in a few weeks, conceal all appearance of the use of the shears. When this practice is followed, it is necessary to go over the hedges in July, in order to cut neatly off, with the knife, any shoots that may have protruded too far, taking care not to injure the leaves. When intended to be kept low, the hedges require occasionally to be cut in, and the operation performed on one side in one year, and not on the other side till two years after. Treated in this way, on good loamy soil, they will endure for a long time; whereas, if they be continually clipped on the surface only, a net-work of shoots will there be formed, which, by excluding the air from the stems within, occasions decay, and the hedge becomes unsightly and naked below. The form of the cross section of a box hedge or edging should always be that of a truncated triangle, with the broadest end near to the ground, as in all cases, the base should be broader than the summit, in order that the rain may fall on the sides, and the light of the sun strike on them with equal force. Next to the holly, a box hedge has the most beautiful appearance in winter, more especially when the ground is covered with snow.

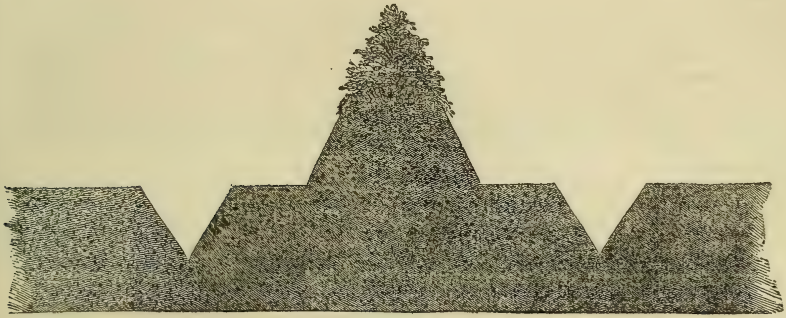
FURZE.

(*Ulex europæus.*)

An erect evergreen shrub, native of Europe, sometimes growing to a height of 10 or 12 feet, and putting forth, in England, yellow flowers from September to May. Indeed, it may be said to be more or less in flower during the year; and hence the proverb: "Love goes out of fashion when the furze is out of bloom." In the province of Brittany, in France, as well as in Normandy, this shrub has been used as fodder for cattle from time immemorial. In England, it is cultivated for hedges as well as for fodder, and as underwood for the protection of young trees and game. It is chiefly employed for hedges in situations where the hawthorn and the holly will not thrive; because the furze is not a plant of long duration, and after being some time in culture as a hedge, it is liable to become naked below, even if clipped or pruned on the sides; and to extend to a great width if left untouched by the knife or shears, unless prevented by ditches cut sufficiently deep. It makes one of the best and handsomest of hedges when kept regularly clipped.

The most ancient, and perhaps the most simple of all fences, are walls made of turf. These walls, however, are much injured by atmospheric influences, and the rubbing and butting of cattle. To guard against this, they should be planted or sown with furze. The roots of this plant will soon penetrate the turf, and tend to bind the

wall. The most expeditious mode of forming a fence in this way is to raise a bank of earth, say 6 feet wide at the bottom, 3 feet wide at the top, and 3 feet high. The seeds may then be sown on a drill along the middle of the top, and the plants either left to grow and hang down at random on the sides, or be clipped into regular shape as a hedge, according to the taste or convenience of the owner. A very good mode is, to clip the hedge on each side, so that its transverse section may complete the upper part of a triangle, of which the earthy bank forms the lower portion, as indicated in the diagram below.



The proper time for clipping such a hedge is either in autumn, after the growth of the shoots is completed, or in the spring, before it has commenced.

When an evergreen hedge is wanting in a garden for shelter or ornament, the Irish or fastigiate variety (*Ulex stricta*) is preferable, as it grows very compact and requires but little or no pruning.

HOLLY, EUROPEAN.

(*Ilex aquifolium.*)

Formerly, when it was customary in England to enclose and subdivide gardens by hedges, the holly was employed by all who could procure the plants, and wait for them to grow. In the temperate parts of the United States, say at the south of the river Potomac, it would form, perhaps, a most impenetrable and the most durable of all live fences; and it has this superior advantage over deciduous-leaved trees, that it is seldom attacked by insects, and at all seasons of the year glitters with its armed and varnished leaves, or blushes with its natural coral. Its chief objection is the very indifferent progress which it makes for the first few years after planting; but after it becomes established in a suitable soil, or about the third or fourth year, there are but few hedge-plants that will surpass it in their growth. It may be carried to a considerable height, and, consequently, is well adapted for situations where strength and shelter are required, especially during winter, when most other hedges are deprived of their leaves.

When the holly is to be planted as a hedge, if it is desirable that the growth may be rapid, the soil should be trenched to a depth of three or four feet. If the subsoil be poor, it is recommended to dig a trench in the direction of the intended hedge, three or four feet wide, and as many deep, and fill up the space with good surface soil, taken

from the neighboring ground or elsewhere. The soil in the trench should be raised at least a foot above the adjoining surface, to allow for settling; and along the middle of this ridge, the plants should be set from 12 to 18 inches apart. According to Miller, holly hedges should never be clipped, because when the leaves are cut through the middle, they are rendered unsightly; and the shoots should therefore be cut with a knife, close to a leaf. This mode, undoubtedly, is more appropriate for hedges of gardens and pleasure-grounds, when it is desirable to preserve an effect more pleasing to the eye; but as this method leaves a rougher exterior surface, and involves a much greater cost than clipping, it is unsuitable where the object is to prevent birds from building their nests, and to maintain effective fences at the least expense. The proper time for clipping appears to be just after the leaves have arrived at maturity, because, at that season, the wounds are repaired in a measure by the healing over produced by the remaining sap, still in circulation.

The seasons most usually adopted for planting the holly, as well as other evergreens, are the spring and in mild weather in winter, although summer and autumn are generally stated to be the proper time for performing that work. The principle which justifies the practice of removing them in winter or spring is, that most plants are more safely planted when they are in a comparative dormant state, and when the weather is temperate, the air moist and still, rather than dry, and in motion; for it is well known that the greatest degree of torpidity in plants or trees exists a short time before they begin to germinate or push out shoots; consequently, as evergreens begin to grow only a week or two later than deciduous trees of the same climate, the proper time for transplanting them must be nearly the same. The chief difference to be observed is, the circumstance of evergreen trees being at no time whatever in so completely a dormant state as deciduous ones; and hence such weather in winter, autumn, or spring, must be chosen for removing them, as will least affect their fibrous roots and leaves by evaporation.

HOLLY, AMERICAN.

(*Ilex opaca.*)

In parts of the country where the European holly will not thrive, and where the soil is gravelly and dry, or in shady places, the American holly may be formed into hedges in its stead. As it is rather difficult to transplant, it is best to sow the seed at once along the line where the hedge is intended to grow.

IVY, IRISH.

(*Hedera helix vegeta.*)

A fast-growing climber, with large-lobed leaves, which, when trained against espaliers, lattice-work, iron hurdles, or wire frames, forms in a very short time most beautiful evergreen walls, or hedges, for the shelter or separation of flower gardens. It is readily propagated by layers or slips taken off or planted in the sites where they are to remain.

JUNIPER, OR WHITE CEDAR.

(*Cupressus thyöides.*)

For swampy grounds, or the extensive marshes which lie adjacent to the salt meadows along our sea-board, and are exposed in high tides to be overflowed by the sea, the juniper, or white cedar, can be formed into a permanent and efficient live fence, by planting young trees in double rows in a manner recommended and described for arbor vitæ.

LAUREL, OR SWEET BAY.

(*Laurus nobilis.*)

An evergreen shrub, native of the south of Europe, always displaying a tendency to throw up suckers, and rarely, if ever, assuming a tree-like character, without the aid of art. As it forms a dense conical bush, when not trained to a single stem, it is well adapted for an ornamental hedge. It is so tenacious of life that a root or stump of it will often send up suckers two years after it has appeared to be dead. It is too tender for the Northern and perhaps for the Middle portions of the Union.

LAURESTINUS.

(*Viburnum tinus.*)

The laurestinus is a beautiful evergreen shrub, with shining leaves and showy white flowers, which appear during the winter months. It is a native of the south of Europe and Northern Africa, in the region of the olive; and hence is suited to the climate of our Southern States. Like the laurel, it shoots so luxuriantly as to render it somewhat difficult to keep the hedges which are planted with it, in tolerable shape; besides, the leaves being very large, if the hedge is clipped with shears, they will be cut through, which would give them an unsightly appearance; and as one of the greatest beauties of this plant is in its blossoms, when the plants are sheared, the flowers are generally cut off, by which, much of their beauty is lost. Nor can this be avoided, where the hedge is to be kept in close order. Therefore, this plant is not so proper for the purpose; but, in such places, where walls or other fences are designed to be hidden, there is no shrub better adapted than this, as the branches are slender and pliable, and may be trained close to the wall, whereby it may be entirely concealed. If, instead of clipping with the shears, the hedge is pruned with the knife, it may be so managed as to have the plants full of flowers from the ground upwards. This may be effected by pruning in April, soon after the flowers disappear, cutting out those shoots which had already flowered, or project too far from the fence, always cutting close to the leaf in order that no stubs may be left; but those new shoots of the same spring must by no means be shortened, because the flowers are always produced at the extremity of those of the same year.

THE COMMON MYRTLE.

(*Myrtus communis.*)

A well-known evergreen shrub of beautiful appearance and sweet odor, growing to a height of 5 or 6 feet in a wild state; a native of the south of Europe, Northern Africa and Western Asia. It is sufficiently hardy to withstand the climate of England, and will even thrive within the reach of the spray of the sea. On the Isle of Wight and in Devonshire, it forms hedges to gardens. It is also cultivated near Toulon and Nice, in France, for the same purpose. It would not probably succeed in our climate north of the Potomac.

OAK, EVERGREEN.

(*Quercus ilex.*)

The ilex, or evergreen oak, is employed for hedges where they are intended to grow rather tall, and is a fit plant for the purpose. When these hedges are planted very young, and kept closely trained from the beginning, they may be made very dense from the ground to the height of 20 or more feet; but they must always be kept narrower at the top than below, in order that not too much snow may lodge upon them in winter, which is apt to break and displace the branches.

ORANGE, WILD.

(*Cerasus caroliniana.*)

The Carolinian cherry, usually called "Wild Orange," is considered as one of the most beautiful vegetable productions of the South, where it is generally selected by the inhabitants to plant near their dwellings, not only on account of its large, dark, shining leaves, numerous white flowers, which put forth in March or April, and its black, oval fruit, but because it grows with rapidity; it stands the knife and shears well, and affords an impenetrable hedge.

PHILLYREA, BROAD-LEAVED.

(*Phillyrea latifolia.*)

A hardy evergreen, native of the south of Europe, called by old gardeners the "True Phillyrea," to distinguish it from the Alaternus, which they simply call Phillyrea. The branches of this shrub are strong, the leaves rather large, and of a dark-green color. As this is a plant of middling stature, hedges planted with it may be trained to a height of 10 or 12 feet; and if these are kept narrow at the top, in order that not too much snow may lodge upon them, they may be rendered very close and thick; and being of a fine green, they will make a handsome appearance. This plant is probably too tender to withstand our climate north of the Potomac.

PRIVET.

(*Ligustrum vulgare.*)

In British gardens, the privet has been held in high estimation for centuries for its use in making hedges, either alone or mixed with the hawthorn, and as affording a screen for concealing objects. Trained against a white stone or plastered wall, it produces a pleasing effect, suggesting the idea of the myrtle, for which it answers well as a substitute. It is a native of Europe, and is sufficiently hardy to withstand the climate of New York.

ROSE, CHEROKEE.

(*Rosa lævigata.*)

This plant, though known by the name of "Cherokee Rose," is believed to be a native of China, and has been adopted as a hedge-plant in the Southern States, as far north as latitude 34°, for at least sixty years. It is noted for its long, flexible branches, large, white flowers, bright-green foliage, and long, straggling and rapid growth. It is readily propagated by cuttings, and may be formed into a hedge by throwing up a ridge of four or six furrows with the plough, afterwards opening the centre by another furrow, and planting the slips therein, about a foot apart, covering them 6 inches deep, leaving one end out, pointing towards the sun; taking care to press the earth compactly around them with the feet. If properly trimmed, a hedge of this sort will afford a sufficient barrier against all stock in four years. If left unpruned, the shoots are liable to extend in all directions from 10 to 20 eet. The cost per mile has been estimated at $15.

ROSEMARY, WILD.

(*Rosmarinus officinalis.*)

A native of the south of Europe, growing to a height of 4 or 5 feet. At Narbonne, in France, it is so abundant, that it is frequently formed into hedges to gardens, where its flowers are very attractive to bees. It may be propagated either by cuttings or seeds, and is thought to thrive best near the sea.

SPANISH BAYONET,

(*Yucca alöifolia.*)

The leaves of this elegant plant are furnished at the extremity with most formidable spines; and spreading out horizontally, they inflict serious wounds, if encountered by animals or man. Its growth is principally confined to Florida, where it is used as an impenetrable hedge.

SPRUCE, HEMLOCK.

(*Abies canadensis.*)

This tree being a hardy native, and possessing a geographical range from Upper Carolina to Hudson's Bay, may be formed into a beautiful

hedge, resembling that of the arbor vitæ, if treated in the same way. It is somewhat rapid in its growth and bears the knife well.

SPRUCE FIR, NORWAY.

(*Abies excelsa.*)

This tree, like the preceding, bears the knife well, and as it is rapid in its growth, it makes good hedges for shelter.

YEW.

(*Taxus baccata.*)

The yew makes excellent hedges for shelter as well as for ornament. When wanted to be of one shade of green, the plants should all be raised from cuttings from the same tree; and when they are intended to show berries, only female plants should be chosen; and the hedge, like that of the holly, should be cut in with the knife, and never clipped with the shears.

In planting yew for hedges, the advantage of having large-sized plants is obvious; and it is recommended, that they should be of seven or eight years' growth, and as many feet high. The season for transplanting, whether of a large or small size, is, as is the case with most of the evergreens, when the sap is in a comparatively dormant state—that is, between autumn and spring, when the weather is open, mild, and, if possible, showery. If transplanted in frosty weather, or while a dry wind prevails, they should be covered with mats or straw. The proper season for clipping is towards the end of June, or when the growth of the shoots has been completed; and to retain a hedge in the greatest beauty and verdure, for the greatest length of time, it ought to be done near the end of July or the beginning of August; and the points of all those twigs which have become stubby from repeated clippings, cut back from 3 to 4 inches. If this be not attended to annually, the entire surface of the hedge will have to be cut into the same depth, every five or six years; otherwise, the surface would become so thick and matted with shoots, as to exclude the air of the interior, and kill a number of the branches, so as to form here and there a gap. These openings are the means of keeping the hedge alive.

HEDGE PLANTS, WHICH ANNUALLY SHED THEIR LEAVES.

AILANTUS.

(*Ailantus glandulosa.*)

This tree, although bearing a bad name in American cities and large towns, in consequence of a disagreeable odor emitted from the male flowers, for a few days only, if thickly sown in a line where it is desirable, will form a live fence, in almost any kind of soil, sufficiently strong to ward off cattle, in four or five years. Like most other rapid-growing trees, however, its endurance will be comparatively short.

ALDER, EUROPEAN.

(*Alnus glutinosa.*)

This shrub is sometimes planted for hedges in moist meadows; also along the margins of streams, to protect their banks by its numerous creeping roots.

ALTHÆA FRUTEX.

(*Hibiscus syriacus.*)

A deciduous shrub, native of Syria and Carniola, from 6 to 8 feet in height, with numerous upright, white-barked branches, which are rather fastigiate than spreading. It has long been cultivated in the open air, in the neighborhood of London, Paris, and New York, where it is perfectly hardy. It is used principally as a garden or lawn ornament, of which it is one of the most conspicuous, producing its single or double purple, white, red or variegated flowers, at a time of the year when few other shrubs are in bloom. It also forms beautiful garden hedges, more especially when the different sorts are planted in harmonious order of succession, according to the colors of their flowers. In this case, the plants should not be clipped with the shears, but carefully pruned with the knife.

ASH, PRICKLY.

(*Zanthoxylum fraxineum.*)

This shrub, when young, is armed throughout with powerful prickles, which are thick at the base, and angular and sharp at the point, but become less numerous when it is old. It is found indigeneous on the borders of rivers and other waters from Canada to Virginia, and as far west as the Mississippi. From its rapid growth and the formidable character of its prickles, it doubtless would form an excellent hedge, while young; but how long it would endure, experience alone must in future show.

BEACH PLUM.

(*Prunus maritima.*)

This shrub abounds along the sandy sea-coasts from Maine to Alabama, and is well worthy of the experiment as a hedge plant in the sand-drifts, where few if any other shrubs will grow, both for protection against the encroachments of the ocean, or as a shelter from tempestuous winds. It can readily be propagated by planting the stones of the fruit.

BEECH, EUROPEAN.

(*Fagus sylvatica.*)

For shelter, especially those lofty narrow hedges, such as formerly were much used in Europe, for enclosing and protecting gardens, orchards, and small fields affording early grass, from strong chilly winds, the beech has few if any equals among deciduous-leaved trees; for, by retaining its withered leaves during the winter, it affords a similar protection as an evergreen

A beech hedge may be trained to a height of 30 or 40 feet, and still be kept quite narrow at the base, like the hornbeam; but it is greatly superior in the richer color of its foliage. In Belgium, particularly in the village of St. Nicholas, between Ghent and Antwerp, very close and handsome hedges are made with young beeches, planted 8 or more inches apart, with their heads inclining in opposite directions at an angle of 45°, so as to cross each other at right angles, and thus form a wall of trellis-work, the open squares of which are 6 or more inches on a side, as indicated in the following diagram.

During the first year, the plants are bound together with osiers at the points of intersection, where they finally become engrafted and grow together on the principle of inarching, or grafting by approach, as shown in the diagram below. Two of the young trees are bent towards each other, and at the point of intersection, two corresponding cuts are made quite to the pith, and the parts bound together by a ligature in the manner represented at the letter A.

BEECH, RED, AMERICAN.

(*Fagus ferruginea.*)

The American red beech being of the same genus as the above, and resembling it in the habit of its growth, doubtless, if cultivated, would form equally as good a hedge. It ramifies quite as near to the earth;

is as numerously divided, and has quite as massy a summit in the appearance of its tufted foliage, which is of equally as brilliant a green. The tree is particularly hardy, as it abounds in great abundance in New England, New York, Canada, and the Lower British Provinces.

BERBERRY, OR PIPPERIDGE.

(*Berberis vulgaris.*)

A small prickly shrub, found wild in rocky places on the hills and lower mountains in most parts of Europe, and in many parts of Asia and America, growing to a height of 7 or 8 feet.

The American variety (*B. v. canadensis*) is found in abundance on fertile hills, and among rocks, especially in the Alleghany mountains, from Canada to Tennessee. It makes excellent hedges, and doubtless would have been much in use, had there not been a prejudice existing against it among the agriculturists both of Europe and America, from its supposed influence in producing blight or mildew on the grain growing near it. This opinion, though totally unfounded, is of unknown antiquity. The blight on grain is generally a species of Uredo, and does not correspond in botanical characters with the Æcidium berberidis, which infests the berberry.

BIRCH, WEST-INDIAN.

(*Bursera gummifera.*)

This tree, although a native of Cuba, Jamaica, and the Bahamas, grows equally well in Florida and other parts of the extreme South. When employed for live fences, it is only necessary to cut truncheons of any size, at the commencement of the rainy season, and plant them in a continuous row 10 or 12 inches apart, with the but-end downward, buried from a foot to a foot and a half deep. For ordinary fence, they may not be cut more than 6 or 8 feet in length, and 3 or 4 inches in diameter; when thus planted, they immediately take root, and in a short time become a durable barrier. This tree, however, is of rapid growth, and consequently will not live to a great age. It is known at Key West by the name of "Gumbo-limbo."

BIRCH, WHITE, EUROPEAN.

(*Betula alba.*)

The young plants of this tree have been formed into hedges in Europe, in poor, mossy, or sandy soils, where it is said they bear the shears as well as any other shrub.

How far any of our American species of birch would answer for hedges, can only be determined by experiment.

BRAMBLE, EUROPEAN.

(*Rubus fruticosus.*)

The common bramble, or "High blackberry," of Europe, has frequently been used in forming live hedges in a poor sandy soil; but cannot be recommended for this purpose on account of the great space it occupies, caused by suckers springing up from its trailing roots. This objection, however, might be obviated by cutting deep ditches on either

side. It forms an excellent barrier against animals, in closing up the gaps of old hedges, or in entering into the composition of those which have lost their spines, or have become naked near the ground.

The same application in this country might be made of our common "High blackberry," (*Rubus villosus*,) remembering the precaution to confine its roots within bounds by ditches sufficiently deep.

BUCKTHORN, PURGING.

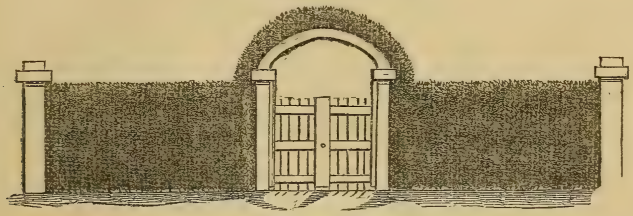
(*Rhamnus catharticus.*)

This product is a low tree or shrub, growing, when wild, to a height of 8 or 10 feet, and from 12 to 15 feet in a state of cultivation. It naturally partakes of the character of a bush, unless it is carefully trained to a single stem. Its branches are numerous and irregular, and when old, are rough and armed with short thorns. It is indigenous to Europe and the north of Asia. It also grows spontaneously in the vicinity of Boston, in Massachusetts, and near West Point, New York.

In common with most plants of its genus, this plant may be easily propagated by seeds or by cuttings and layers. It prefers a rich, moist soil, in rather a shady situation; but it will thrive in any place where the currant or gooseberry will succeed. It is cultivated in Europe chiefly as an ornamental shrub, and is becoming of great utility in this country as a hedge plant, as will be seen by the following extract from a paper by Mr. E. Hersey Derby, of Salem, Massachusetts, published in the Transactions of the Essex County Agricultural Society: "In the year 1808, I happened to have some young plants which had come up from the chance scattered seeds of the Buckthorn, and finding they had made a good growth in the nursery to which they had been removed, I determined to try to form a hedge of them, and I have been well pleased with the result. They were set out in 1809, and very soon became a fine hedge, of about 20 rods in length, which has remained so until the present time, (September, 1842,) not a single plant having failed from it, nor have I ever known it to be attacked by any insect. This hedge being my first experiment with the Buckthorn, I did not keep it down so closely as I have since found it expedient to do, and consequently it is not quite so impervious at the bottom as some of my younger hedges, which have been more severely pruned. Being fully satisfied that I had at last found the plant I wanted, I have, since that time, set out various hedges of it, at different periods, until I can now measure 160 rods of them—all, in my opinion, good hedges; and I do not hesitate to pronounce the Buckthorn the most suitable plant for the purpose that I have ever met with. It vegetates early in the spring, and retains its verdure late in autumn. I have often seen it green after the snow had fallen. Being a hardy plant, it is never injured by a most intense cold; and its vitality is so great that the young plants may be kept out of the ground for a long time, or transported any distance without injury. It never sends up any suckers, nor is disfigured by any dead wood. It can be clipped into any shape which the caprice or ingenuity of the gardener may devise; and being pliable, it may be trained into an arch, or over a passage way, as easily as the vine; it needs no plashing nor interlacing, the natural growth of the plants being sufficiently interwoven. It is never cankered by unskilful

clipping, but will bear the knife to any degree. During the last winter, I found one of my hedges had grown too high, casting too much shadow over a portion of my garden; and wishing to try how much it would endure, I directed my gardener to cut it down within 4 feet of the ground. This was done in mid-winter, and not without some misgivings on my part, and much discouraging advice from others; but it leaved out as early in the spring as other hedges, and is now a mass of verdure. I have been applied to for young plants by persons who have seen and admired my hedges, and have sent them to various States in the Union, and I have never, in any instance, heard of their failure.

"My method of forming a hedge is to set the young plants in a single row, about 9 inches apart, either in the spring or autumn; if the latter, I should clip it in the following spring within 6 inches of the ground; this will cause the hedge to be thick at the bottom, which I regard as a great point of excellence; after this, all that remains to be done is to keep it from weeds, and clip it once a year. I consider June the best time to trim it, as it soonest recovers its beauty at that season. The clipping may be done either with the garden shears, a hedge knife, or even with the common scythe."



The above diagram shows a pleasing mode of growing a hedge of this species in front of a dwelling, or for dividing a garden or ornamental ground. As the plants will attain a considerable height, they may be trained over an arch or trellis, and form a beautiful, densely-shaded arbor or walk.

BUCKTHORN, SEA.

(*Hippophae rhamnöides.*)

A plant common throughout Europe and Asia, which is sometimes cultivated for hedges near the sea to fix drifting sands, in connexion with the sea-reed (*Arundo arenaria*) and the sea-side Lyme grass (*Elymus arenarius.*)

CAPER BUSH.

(*Capparis spinosa.*)

This well-known shrub, trailing and rambling like the bramble, is found on the rocks of Spain, Italy, the Grecian islands, and various parts of Western Asia. When cultivated, it attains a height of 4 or 5 feet, with a head covering a space of about the same diameter. From the numerous spines which cover the branches, it might form an excellent hedge to cover a bank of earth in the extreme South, as

recommended for firs. It is altogether too tender to withstand much frost.

CHINQUAPIN.

(*Castanea pumila.*)

This shrub, which is a native, from its thick, branchy, and dwarfy growth, and facility of cultivation from its nuts in almost any soil which is not actually wet and springy, in the Middle and Southern States, doubtless would form an economical hedge.

CHRIST'S THORN.

(*Paliurus aculeatus.*)

A branching deciduous shrub, or low tree, native of both shores of the Mediterranean, and the west of Asia, growing to a height of 20 or 30 feet. In Italy, hedges are formed of it in a similar manner as the hawthorn is in England. The poet Virgil, when describing in figurative language Nature as mourning for the death of Julius Cæsar, says: "The earth was no longer covered with flowers nor corn, but with thistles, and the sharp spines of the Paliurus." Columella recommends excluding this plant entirely from gardens, and planting them with brambles in its stead, for the purpose of forming hedges. In the south of France, wherever the Paliurus has been adopted for hedges, the same objection is made to it as to those of the common sloe in England, namely, that it throws up so many suckers in a short time as to extend the width of a hedge considerably on both sides. This objection, however, could be overcome by digging ditches on each side of the hedge sufficiently deep to stop the spread of the roots.

As this species abounds in Judea, and as the spines are very sharp, and the branches very pliable, which allows them very easily to be twisted into almost any figure, Belon supposed the crown of thorns, which was put on the head of Christ before his crucifixion, was composed of them. Josephus says: "This thorn, having sharper prickles than any other, in order that Christ might be the more tormented, they made choice of it for a crown for him." Hasselquist, however, thinks that the crown of thorns was formed of the Zizaphus spina-christi; while Warburton contends that it was the Acanthus mollis, which can hardly be considered as prickly at all.

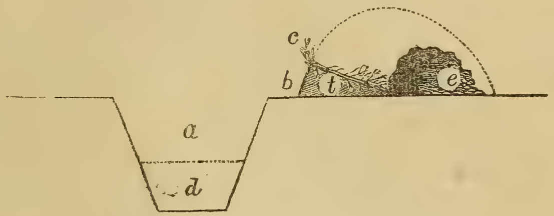
HAWTHORN.

(*Cratægus oxyacantha.*)

The hawthorn, on account of the stiffness of its branches, the sharpness of its thorns, and its capability of resisting a northern climate without injury, is universally preferred in England to all other trees for hedges, and may be so managed as to present a barrier to all kinds of cattle, and not to be passed, without difficulty, even by such persons as might attempt to intrude upon the grounds of others. But it will do no good unless planted in a soil that is naturally dry and fertile, or one that has been made so by art. The plant is never found in its native habitat on a wet soil; and if planted on such, it soon becomes stinted

in its growth. The situation should be airy, although it will grow either in exposed places, or in such as are sheltered, and even shaded by other trees. In cases of this kind, however, it neither forms a handsome tree, nor a close, thick hedge.

The common practice of making hawthorn hedges in Europe, is to plant the young trees in a straight line from 4 to 6 inches apart, either upon an embankment or on the level surface, according to the wetness or dryness of the soil. In the preparation for planting, a suitable bank is first constructed for the reception of the plant. The direct line of the hedge being staked out in the usual manner, the bank is commenced by ditching, by forming it with the excavated earth. It should be so constructed, that the plants when placed upon it have a slight inclination upwards. A sod, or turf of earth, say a foot in length, somewhat broader than a spade, of a wedge-shape, 5 or 6 inches deep at the thick end, should then be raised and inverted with the grass-side downward along the edge of the marked line, which, when neatly pared and beaten down with the back of the spade, forms, as it were, an inclined plane, upon which the plants are afterwards to be placed, as indicated in the following diagram by the letter *t*.



Then a ridge *e*, is formed just back of the foot of the inclined plane referred to above, of the best mould or soil taken from near the surface, *a*. In making choice of plants, a good fibrous root, and a clear stem, are essentially necessary for a quick growth, and, if possible, those which have been transplanted two years in nursery lines should be preferred. Previous to planting, the top of the stem should be cut off with a sharp knife about 5 or 6 inches above the roots, giving the cuts an inclination upwards. The long part of the tap-root, as also any diseased or decayed fibres, should be removed. If cut in frosty weather, immediately after the operation they should be covered with earth; and, when likely to be frosty, planting in the afternoon should carefully be avoided, as there may not be time to cover the plants with a sufficient quantity of earth to resist the effects of the cold at night. Indeed, in such weather, it is much the best way to defer the business altogether. On the other hand, if planting be commenced in spring, and the hedge is to be laid upon dry land, the plants, after they have been cut, should be placed in a puddle of earth and water in a shady place till wanted; for by so doing, their germinating powers will be greatly accelerated. When quite ready, the plants may then be placed along the inclined turf from 4 to 6 inches apart, so that their points, where they are cut, may be about an inch beyond the sod towards the

ditch, as indicated by *c*, covering them over with the ridge of rich earth, *e.* Then the remainder of the earth is taken from the bottom of the ditch *d*, and thrown up in a neat ridge over and behind the plants, as indicated in the diagram by the dotted line. If the land is not too costly, the ditch may be made from 4 to 6 feet wide at the top, a foot and a half wide at the bottom, and 2 or 3 feet deep, leaving a berm *b*, between it and the bank, 2½ feet wide, in order that each side of the ditch may have a proper slope, and to prevent the washings from running directly into it; for when the banks are made too upright, they are very subject to fall down after every frost or hard rain; besides, if the ditch is of sufficient width and depth, it aids in increasing the effects of the hedge in forming a barrier against animals.

If the bank for a hedge be without a ditch, the plants should be set in two rows, almost perpendicular, at a distance of 10 or 12 inches from each other in the alternate or quincunx order, so that, in effect, they will be but 5 or 6 inches asunder.

Sometimes, when hedges are designed for middle fences, to divide fields, a two-sided bank is raised a yard high, and as broad at the top, having a slight ditch on each side; and each side of the bank is formed with square spit turves, from the adjoining ground, and the middle filled up with mould from the ditches on each side, so that when finished it forms a yard-wide border all the way along the top, and along the middle of which are planted too rows of hedge-sets, or seeds, in drills, at distances as before described. But in places where no ditch nor raised bank is required, as may be the case for middle hedges in the interior parts of grounds, especially in gardens, then, the plan for the hedge being marked out on the level ground 2 or 3 feet broad, it is dug along one good spade deep, at least, and then planted with sets of any sort in two rows ranging along the middle; or if it is designed to sow seeds, &c., of any sort at once, where it is intended to have a hedge, they are placed in two drills, a foot asunder the whole length.

In respect to general culture of these hedges, it may be remarked, that all such as are exposed to cattle must be fenced as soon as planted, either with a stake and bush hedge, with hurdles, or with rails and open paling, for four or five years, till the hedge grows up, taking care not to place the fence too close to the hedge to interrupt its growth. The hedge must also be duly weeded while young, and this should be particularly attended to the first two years. With respect to the trimming or pruning, it should be done with the greatest precaution and nicety, as upon this, the beauty and future value of the hedge very much depend. The proper time for this operation is either late in autumn, or early in the spring, or about mid-summer, but not late in the spring season, when the sap is flowing; the check and injury the plants would unavoidably receive from such a practice, may be readily conceived. All straggling branches, growing over the ditch, may be trimmed off, leaving those behind towards the bank untouched. A hedge, however, will hardly be found to require much pruning the first year; but should any branches grow so luxuriant as to overtop the rest, they should be switched off to a uniform height. In trimming, it is the practice with some to use shears, but the

"switching bill" or a scythe would undoubtedly be the best instrument for the purpose, as with it the stroke can be made upwards, forming a clean, smooth cut. If, on the contrary, the stems and branches, instead of being cut off smoothly, are splintered, which would allow the wet to lodge in the heads of the stems, they would soon decay.

It may here be remarked that plants will not prosper in an old hedge-bank which had previously been planted with the same species; therefore, it is generally advisable to throw down the old bank, and put in plants of a different description.

HORNBEAM, EUROPEAN.

(*Carpinus betulus.*)

In France, a trained hornbeam hedge (charmille) is formed in the following manner: The ground is trenched one or two months beforehand. The nursery from which the sets are taken may be three, four, or even six or seven years old. The former is the least expensive, and the most certain of success; but the latter sooner produce the desired effect. The plants, whether they be large or small, have their side-shoots severely "cut in;" they are planted in a single line from 6 to 8 inches, and even a foot apart, according to the height at which the intended hedge is to grow. The second year, any straggling shoots which may appear are shortened, and the vacancies filled up, if any plants may have failed. The third year, if the plants were tolerably large when put in, the hedge may be regularly clipped or sheared; but if they are small, the clipping should not take place before the fifth year. As a general rule, when it is desirable that the hedge should have a considerable height, the clipping is postponed longer than when it is to be kept low.

With regard to the after treatment, it is recommended that the clipping of a hedge of this sort should be done only once a year, and this at about mid-summer, or just before the plants have completed their annual shoots, as they will soon afterwards make new ones, or at all events protrude a few leaves, and thus in a week or two conceal the effects from the use of the shears. The hedge may be from 8 to 10 feet high, and from 8 to 24 inches thick.

In Germany, when the husbandman erects a hornbeam fence, he first throws up a parapet of earth, with a ditch on each side, and plants his sets, raised from layers, in such a manner that two plants may be brought to intersect each other, in the manner as recommended with the European beech. Instead of cutting the wood, as there described, he scrapes off the bark, and binds them closely together with bast or straw. In consequence of this operation, the two plants grow together, in a kind of indissoluble knot, and push from them horizontal or slanting shoots, which form a living palissade, or chevaux de frise, so that such a protection may be called a "rural fortification." These hedges, when pruned annually and with discretion, in a few years, form an impenetrable barrier against animals in every part.

HORNBEAM, AMERICAN.

(*Carpinus americana.*)

How far the American horbeam, usually called "Blue" or "Bastard Beech," would answer for hedges, if treated after the manner of the European species, can only be determined by experiment. Its branches are numerous, short, and thickly set—so much so, as to give the whole tree a stunted appearance. It is sufficiently hardy to withstand the climate from the mountainous parts of Tennessee nearly to Hudson's bay. It will grow in almost any soil or situation, and may be propagated either by layers or from seeds.

LARCH, EUROPEAN.

(*Larix europæa.*)

In England, the larch, when 10 or 12 feet high, is sometimes set from 15 to 18 inches from centre to centre in the embankment of a four-foot ditch, at an angle of about 30° with the horizon, having the tops inclining a little over the ditch, towards the interior of the field, which forms an efficient hedge against cattle. The top of the ditch-bank might be from 20 to 24 inches above the ordinary level of the ground, and the upper part of the roots about 3 inches below the surface. When the earth is dressed off, every other larch might be made to rest on a forked stake, driven perpendicularly into the ground near the edge of the ditch, into which it might be tied to prevent the trees from assuming an upright position, and to prevent them from being injured in their growth by waving from the wind. In this manner, fewer trees would form a more efficient fence than if standing upright. The trees should be well feathered at the bottom with side-branches, which should be allowed to remain on the stems. The transplanting may be done any time from November till April.

LILAC.

(*Syringa vulgaris.*)

The lilac, when mixed with the sweet briar, the sloe, the guelder rose, or the scarlet thorn, can be made to form a beautiful hedge to a cottage garden, in any situation where there is an abundance of room.

LOCUST, HONEY.

(*Gleditschia triacanthos.*)

The honey-locust or three-thorned acacia, when young, is armed with large prickles, which, though not ligneous, become hard, and remain attached to the bark often for several years. They are not only produced from the young wood, but occasionally protrude themselves from the trunk, even when the tree is of considerable bulk and age. From this circumstance, attempts have been made, both in Europe and in this country, to form hedges of this plant; but in no instance have they proved effectual beyond a few years.

MAPLE, EUROPEAN FIELD.

(*Acer campestre.*)

This is rather a small tree, with spreading branches, native throughout Central Europe and the north of Asia. In England, it is common in hedges; and in France, it is used for filling up gaps in old fences. The variegated variety (*A. c. foliis veriegatis*) is quite showy and ornamental. If a hybrid could be produced with red flowers by cross-fecundation with the American red-flowered maple, (*Acer rubrum,*) the result would be a singularly handsome little tree. Even a red tinge added to the autumnal foliage would be valuable. To produce a hybrid of this sort, would require the variegated to be forced forward in a green-house, or the red maple to be retarded in an ice-house, as the two species flower at different periods.

MAY, ITALIAN.

(*Spiræa hypericifolia.*)

A low shrub, native of Europe, which sometimes forms a handsome garden hedge, and well bears the shears. Formerly, when topiary work was fashionable in garden scenery, it was often applied and cut into a variety of artificial forms.

MULBERRY, WHITE.

(*Morus alba.*)

In Guernsey and the north of France, also in some parts of Italy, the white mulberry is cultivated as a hedge-plant, or as a pollard, a portion of the leaves being annually plucked for the food of silk-worms.

OAK, EUROPEAN.

(*Quercus sessiflora.*)

The European oak (Chêne de haies) is mentioned by Bosc as common on the Jura and in the mountains of the Vosges, where it is planted for hedges, which seldom exceed the height of 6 or 8 feet.

The American "Bear," or "Black Scrub oak," (*Quercus ilicifolia,*) might probably be usefully employed in the Middle and Northern States for hedges, by sowing the acorns in furrows, which, in a few years, would be sufficient to prevent the passage of cattle or sheep.

ORANGE, OSAGE.

(*Maclura aurantiaca.*)

The Osage orange, the favorite hedge-plant of the United States, is too well known to require a lengthened description here. From its hardihood, rapid growth, tenacity of life, facility of propagation, as well as its unrivalled beauty and protection against animals of various kinds, its utility no longer remains an experiment.

Hedges of the rarest beauty and excellence have long been growing near Boston, Philadelphia, and Cincinnati, as well as in Kentucky, Tennessee, Northern Missouri, and, in short, in all the Middle and Southern States. Some of these fences have been standing for twelve or fourteen years, and their branches have become so interlocked, guarded

as they are by their enormous spines, that no farm-stock can pass through them. They are also free from the attacks of insects and animals of all kinds.

This tree may readily be propagated by seeds, from which it will grow sufficiently large in three years to form a hedge. It succeeds best on land moderately rich—such, for instance, as will produce good Indian corn; but it will grow in almost any soil that is not too moist. The line of ground intended for a hedge should first be dug and well pulverized—say from 12 to 18 inches deep, and 2 feet wide, along the centre of which the plants may be set.

When the Osage orange is to be planted as a hedge, if the sub-soil be poor, it is recommended to dig a trench in the direction of the intended hedge, 2 or 3 feet wide, and as many deep, and to fill up the space with good surface-soil taken from the neighboring ground or elsewhere. The soil in the trench should be raised at least a foot above the adjoining surface, to allow for settling; and along the middle of this ridge, the plants should be set from a foot to 18 inches apart.

The seeds, before sowing, should be soaked in tepid water, in a warm room, for three or four days; or they may be mixed with equal parts, by measure, of moist earth, and exposed a few weeks, in open boxes, to wintry weather, on the sunny side of a building, in order to freeze and thaw. It is preferable to sow them early in the spring, in a garden or nursery, where they will shortly after germinate and form young plants. These should be carefully weeded or hoed during the first season's growth, and transplanted in the hedge-line in the month of March or April of the following year.

PEAR TREE.

(Pyrus communis.)

In France, and in some parts of England, wild pear trees and crabs spring up accidentally in the seed-beds of hawthorns in nurseries; and, consequently, they are planted out with the thorns in the hedge-rows, where they become trees and produce fruit. From this source, fine new varieties of fruit have been obtained in both countries. This naturally suggests the idea of planting pear and crab stocks in the hedge along with hawthorn and other plants, in a regular systematic manner, and grafting or budding them with suitable varieties when they have attained sufficient height for standards. Though this is not the most rapid mode of introducing fruit trees into hedge-rows, yet it might in the end prove economical. It has been recommended that pear stocks be planted in hedges, at a distance of 20 or 30 feet apart, and allow them to grow up to a single stem, or be grafted; for they could never do any harm to the hedge, as it is well known that good live fences have been made of crabs and wild pears alone. The common objection to planting fruit trees in hedges is, that depredations would be made upon them by the poor; but if we would avoid such depredations on the trees of the rich, we should assist in humanizing and rendering better and happier their condition, by thus furnishing them with an abundance of fruit. Girard, who wrote on the subject three hundred years ago, says: "The poore will breake downe our hedges, and wee haue the least part of the fruit. Forward,

in the name of God, grafte, set, plant, and nourish up trees in euery corner of your ground; the labour is small, the cost is nothing; the commodity is great; yourselues shall haue plenty; the poore shall haue somewhat in time of want to relieue their necessity: and God shall reward your good mindes, and diligence."

POPLAR, LOMBARDY.

(Populus fastigiata.)

In England, hedges for shelter have frequently been made of the Lombardy poplar, in which case they are trimmed off at a certain height, and regularly cut in on each side, so as to form a verdant wall 8 or 10 feet high, 18 inches wide at the bottom, and 6 inches at the top. It is an excellent tree for sheltering or shading either gardens or fields in a flat country; but care must be taken to plant it sufficiently far, where shelter is not wanted without shade; that is, not to introduce it in the south side of any garden or orchard, unless at a distance of at least twice its ordinary height.

ROSE, CULTIVATED AND WILD.

(Rosa.)

Hedges are formed both of the wild and cultivated rose; but they are not all well adapted to the purposes of protection and enclosure, from their rambling habit of growth, the large space they occupy when untrimmed, and their liability to become naked below, when cut on both sides, so as to occupy only the space usually allotted to a hawthorn hedge. For garden hedges, however, many of the varieties are eligible, more especially the fastigiate growing kinds, such as China roses, (*Rosa indica*,) which, in warm and temperate climates, form a very handsome evergreen hedge, flowering nearly all the year. The small-leaved rose (*Rosa microphylla*) may also be used for hedges, both on account of its rambling habit and thick, sharp spines. The "Cherokee Rose" has already been described as an evergreen under another head.

SWEET BRIER.

(Rosa rubiginosa.)

A good hedge may be formed of this plant by sowing the "heps," or fruit, in the autumn as soon as ripe, or, what is better, early in the spring, having kept them in the mean time mixed with sand. But it is far more convenient to try young plants, and set them a foot apart early in November. Let them grow as they like for the first year, then cut them down to the ground the second, and they will afterwards spring up and require no other care than occasionally trimming with the pruning knife or shears, to keep the hedge in shape. When the stalks become naked at the bottom, they should again be cut down.

SLOE, OR BLACK THORN.

(Prunus spincsa.)

A spiny shrub, native of the north of Europe, and may be used in connexion with other plants, as the bramble or firs, when ditches are

dug sufficiently deep on both sides to prevent the spread of the roots, which would otherwise throw up numerous suckers to the detriment of the crops in the adjoining fields. This shrub is very hardy, and has become indigenous in Pennsylvania, and other parts of this country.

THORN, WASHINGTON.

(*Cratægus cordata.*)

A handsome, low shrub, growing to a height of 15 or 20 feet in greater or less abundance in rocky places, and on the banks of streams which issue from the Alleghanies, from the Canadas to Georgia. Its head is close and compact, with branches armed, with very long, slender, sharp spines. It was first cultivated in the nursery of Mr. Main, of Georgetown, in the District of Columbia, towards the close of the last century, and has since been much employed in other parts of the United States for hedges under the name of "Washington Thorn." But, either owing to its unsuitableness for the purpose, or to want of proper care and knowledge in the management, the hedges did not prove durable and efficient, and it has for some time been abandoned.

WILLOW.

(*Salix caprea.*)

In Europe, fences of live willows in some cases are formed by inserting into the soil rods of two years' growth, such as are used for making hoops, reduced to the length of 6 feet; from 12 to 18 inches of which are buried below the surface. These make a fence at once from 4 to 4½ feet in height. The rods may be inserted, if desirable, in a vertical direction parallel to each other, 6 or 8 inches asunder; or they may be disposed in an inclined position, also parallel to each other, crossing each other at right angles, after the manner noticed in the hornbeam and beech, by inarching. A top-pole, or rail, is required to unite the ends of the parallel rods; or the fence may be wattled together by horizontal rods. D. J. B.

CULTIVATION OF THE OSAGE ORANGE FOR HEDGES.

BY JAMES McGREW, OF DAYTON, MONTGOMERY COUNTY, OHIO.

In cultivating the Osage orange, great care should be taken in the selection of good seed. The most certain way of testing it is to take a tumbler and fill it two-thirds full with warm water; then put sufficient cotton in it to keep the seed you put on it just above the surface. The cotton in this way will keep the seed moist, which will also have the benefit of the air; and if kept in a warm room, it will soon vegetate. It may be necessary to change the water in the tumbler several times in the course of the process.

The best method of sprouting the seeds is as follows: Soak them in warm water from thirty to forty hours; then put them into shallow

boxes, not more than 4 or 5 inches deep; to every bushel of seed, put half a bushel of sand, (smaller quantities in the same proportion,) then mix thoroughly, keep it in a warm place, and wet it as often as twice a day with tepid water, stirring it well as often as three times in twenty-four hours. The seed should be put to soak from the 15th to the 20th of April, in this latitude. I do not know the precise temperature, but should think from 65° to 75° F. would be about right. Seeds attended to as above, and kept in a warm place at a proper temperature, would sprout sufficiently in ten days, to put into the ground. It will be necessary, however, to have the seeds well separated from each other before planting.

Much care should also be taken in the selection of a good piece of ground for the nursery, or place of sowing the seed. It should be new, fertile, and as free as possible from the seeds of grass and weeds. It should be mellow, rather inclined to moisture, but not subject to "bake." Good prairie land, which has been broken up the year previous, is undoubtedly preferable. It should be well ploughed, harrowed, and rolled, if necessary.

When the ground has been prepared as described above, and well pulverized, the seed may be sown by hand in dibbles, or drills, 16 inches apart, at the rate of a quart to each 3 or 4 square rods, which would amount to from 5 to 6 pecks to the acre. The covering of the seed can best be done with light steel rakes. The hands employed in this operation should walk upon the side where the seed is covered, in order that they may draw all the earth one way, to fill the holes or drills. The sowing being once completed, nothing more is necessary to be done before the plants begin to come up in sufficient numbers to indicate the direction of the drills. The spaces between the drills should then be hoed, after which all weeds and grass that may be among the plants should be pulled out by hand. This process of hoeing the spaces between the rows, as well as the weeding, should be repeated as often as necessary, in order to keep down the weeds, and the ground loose and in good condition. Then, if the soil be rich, the season favorable, and proper cultivation given to the plants, they will be sufficiently large for removing the following spring.

In removing the plants, a subsoil plough may be used to cut them off, the share of which should be of steel, quite large, and as flat as possible. The depth of its running may be regulated by a wheel in front, at the end of the beam. The plants should be cut off about 8 or 10 inches below the surface of the ground. They may then be gathered in bunches, stored away in some suitable place, with the roots covered, to keep them moist, in order that they may afterwards be taken out, assorted, tied into bundles of from fifty to one hundred, with their tops cut off upon a block with a hatchet or an axe, when they will be in readiness for boxing or shipping. In packing them, the boxes should not be too tight, as some air is necessary to prevent the plants from moulding [?] Small boxes, or those of moderate size, are the best, say about 3 feet long and 18 or 20 inches deep and wide.

Preparatory to setting a hedge, the ground should be thoroughly broken up to a depth of 12 or 14 inches, the "lands" being at least 10 feet wide. By setting the plants in the centre of the "lands," there

would be left spaces 5 feet wide on each side to cultivate. When a hedge is to be set along the site of an old fence, the latter should be removed the year previous, and the land broken up and cultivated. After the ground has been fully prepared, the row should be staked off, and a line stretched along its length to work by. The holes for inserting the plants should be made with a pivoted iron, 12 inches in length, and 3½ inches in diameter at the top, with a socket into which is inserted a handle, with a pin at the top of the socket, to bear the foot upon in forcing the instrument into the ground in making the holes. These holes should be about 8 inches apart, into which the plants should be inserted about an inch deeper than they originally grew in the nursery. This being done, the earth should be well packed about the roots.

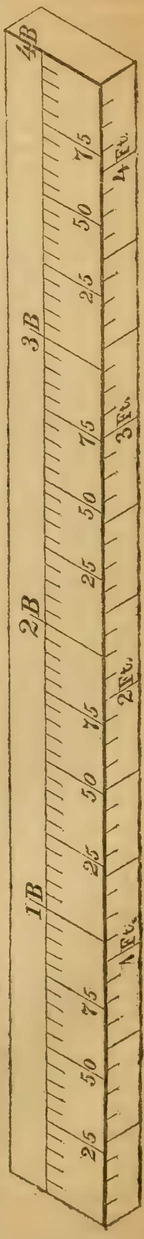
Next comes the operation of cultivating, hoeing, ploughing, &c. The spaces on both sides of the hedge require thorough cultivation, and the ground kept clear of grass and weeds, during the season. No stock should be allowed in the enclosure where the hedge is set until after harvest, and not even then, if it can be avoided. After first year, the growth will be sufficiently robust for the hedge to protect itself.

The next spring, or one year after the hedge is set, the plants must be cut off near the ground, below all the buds, just above the top of the roots. The roots will then swell and put out a number of strong shoots near the surface of the ground. The hedge then needs thorough cultivating until about the middle of June, when it should have another trimming, within two inches of the former cut, and again cultivated as before. By this process of cutting, there is formed at once a strong, firm base, which, if properly carried out, will render success certain. The second spring after transplanting, the hedge may be trimmed 6 or 8 inches above the former cutting, and again in June, 8 inches higher, after which, the latter part of the summer's growth will make it sufficiently strong to answer the purpose of a good fence. After this, trimming once a year will be all that is needed, which should be done in the latter part of summer or early in autumn, before the hardening of the new wood. The first cutting, which will be one year after the hedge has been set, can best be done with a pair of shears made for the purpose. The second cutting can be done with a short heavy bush-scythe, hung upon a strong, stiff snathe. The cutting of the second year can also be done with a scythe. The best way is to walk along the row with it at the right hand and cut half way to the centre of the row. When arrived at the end, turn about to the right and come back upon the other side of the row and trim off the other half as before. In so doing, the hedge will be cut in an oval shape. Then, by taking a large corn-cutter, it can be trimmed into proper form. Great care should be taken to secure a close, strong, firm base. This can be done by allowing the lower branches to extend out in all instances, so as to form a base at the end of the second season, at least 4 or 5 feet wide. The trimming of the third year can be done in the same manner as that of the second. The fourth and subsequent years' trimmings will have to be done monthly with the knife, preserving at all times the shape above described.

MISCELLANEOUS.

PROPOSED RULE FOR MEASURING BUSHELS.

BY J. H. FORMAN, OF OAK BOWERY, CHAMBERS COUNTY, ALABAMA.



Having frequently seen published rules for the measurement of cribs, boxes, bins, wagon-bodies, &c., and perceiving that a bushel is just as determinate a quantity as a foot, and these rules are all based upon the fact that four Winchester bushels are nearly equal to five cubic feet, I would propose the following method, which will approximate nearly to the truth:

First, take a rod of convenient size, say $51\frac{5}{8}$ inches long, [more exactly, $51\frac{63}{100}$,] $1\frac{1}{4}$ inches wide, and half an inch thick, and divide its length into four equal parts, numbering them with large plain figures. Then divide each division into ten equal parts with smaller figures. The larger divisions will be the lineal dimensions of a cubic bushel, and the smaller ones, decimals, or tenths. Now, to apply the rule, one has only to take the three dimensions, length, breadth, and height, or depth, of the box in bushels and fractions, and multiply them together, and the result will be in bushels, and the decimals of a bushel.

Note.—I would suggest that the side indicating bushels first be divided into four equal parts, as proposed above, and then each division also into four equal parts, which would denote fourths of a bushel, or pecks, and each of the minor divisions into twenty-five equal parts, which would indicate hundredths of a bushel. To those who are familiar with decimal arithmetic, the application will be obvious. For instance, if it were desirable to ascertain the number of bushels of charcoal in a cart of any size, it would only be necessary to measure with this rule its length, width, and height, in bushels and hundredths of a bushel, and multiply each of the dimensions continually together, and the product would be the number of bushels and the decimal of a bushel sought. Again, if it were necessary to make a box or a bin to contain a given number of bushels, first fix upon its length and width in bushels, as per rule, divide the number of bushels in its contents by the product of its desired length and width, and the result will be the height, or depth. The contents in bushels of all other regular boxes, cellars, cylinders, &c., may also be determined by this rule, subject to the laws of mensuration, exactly in the same manner as though the rule were expressed in feet and its parts.

The other three sides of the rule might be divided and subdivided into other measurements, as yards and hun-

dredths; feet, inches, and twelfths; feet, inches, and tenths; feet, inches, and eighths; or feet, tenths, and hundredths; which would often be found useful in almost every situation, as well as on the farm.

D. J. B.

ON THE USE OF WATER PASSING THROUGH LEADEN PIPES.

The poisonous nature of lead when imbibed by man or animal, is too well known to require a lengthened description here; for it has been proved, by direct experiment, that pure water, containing much atmospheric air, carbonic acid, and some other foreign substances, has the power of corroding it, and dissolves the newly-formed oxide; and that, the longer water, thus contaminated, remains in contact with the lead, more especially if the air has free access, the more lead will be dissolved, and the water, of course, will become more poisonous. The leaves of trees, and, in fact, any other organic matter, in a state of decay, have a tendency, more or less, to induce the same effect. But river, well, or spring water, containing, in solution, $\frac{1}{30,000}$th part of phosphate of soda, or iodide of potassium, exerts no such influence. The pipes in contact with such water gradually become lined with a superficial film of an insoluble salt of lead, which adheres tenaciously, and no further change takes place. Many other neutral salts act in a similar manner, among which are the carbonates, phosphates, sulphates, chlorides, and iodides; their power being in proportion to the relative insolubility of the compound which their acid is capable of forming with lead. Hence, ordinary water, which abounds in mineral salts, may be safely conducted through leaden pipes, but *distilled and rain water, or water that contains scarcely any saline matter, such as often occurs in wells, springs, streams, and lakes, in a purely granite region,* speedily corrode and dissolve a portion of lead whenever brought in contact with it. In all such cases, leaden pumps, cisterns, and pipes, should be coated with tin, inside and out, which will render them perfectly secure from injurious effects.

It is possible, however, that water, on passing rapidly through a leaden pipe of moderate length, in constant use, may not be so impregnated as not to be pernicious to health. It may be observed, that the poison of lead differs very materially from most other substances called poisonous. It is not what is denominated an active poison, and is not accompanied by any particular symptoms, except when introduced into the system in considerable quantities. On the contrary, the salts of lead may be ranked among those insidious substances which are taken without any peculiarity of taste or smell, but which, when gradually introduced into the system, by minute quantities at a time, will eventually produce paralysis, swollen fingers and wrists, followed by that dreadful disease, termed the "painter's colic," and finally premature death.

D. J. B.

CLIMATOLOGY.

The following communication on the climate of New England was communicated to the Board of Agriculture of Massachusetts, which, from its interesting and valuable character, is given entire.

REMARKS ON THE CLIMATE OF NEW ENGLAND.

BY J. C. GRAY, OF CAMBRIDGE, MIDDLESEX COUNTY, MASS.

It has been a general, and perhaps still a prevailing impression among the inhabitants of New England, that our climate is much warmer now than two hundred years since. This position has been distinctly assumed by some of our best historians and naturalists, and many ingenious reasons have been given for the change. The explanation which seems to have met with most favor, is that which ascribes the alleged softening of the winter's cold to the clearing away of large tracts of forest trees. It is believed, however, that the position itself may be fairly called in question, and that philosophers, by a mistake not unprecedented in the observers of natural phenomena, have employed themselves much more diligently in accounting for a striking phenomenon which they have assumed to exist, than in collecting precise evidence to determine the fact of such existence. Much less of this evidence exists than could be wished, or than is now customary to collect and preserve on all scientific topics. The science of meteorology, or the observance of the weather, in the largest sense of the words, is even now in its infancy, and the instruments necessary for carrying on such observations with precision are of very modern date. The thermometer was little used in this country, or even in older countries, previous to the last century, and all instruments of this kind employed in the early part of that century were very imperfect. Till after the year 1750, the only thermometer used in New England was Hawksbie's. Not a single specimen of this instrument is now known to exist. There is good reason, however, to believe that it was much less accurate than any thermometer now employed. During more than half a century, however, that of Fahrenheit has been in general use throughout New England, at least, and we possess an exact register of observations made with it during more than forty years on one spot, and by one individual, the venerable Dr. Holyoke, of Salem. A particular account of this register may be found in a valuable paper by the late Dr. E. Hale, in the "Transactions of the American Academy," vol. i., New Series. The temperature of each day was thrice noted at the same hours during the whole period. As a comparative statement, therefore, of the earlier and later portions of that period, it is of singular value. No conclusion can be drawn from it, as Dr. Hale has clearly shown, favoring, in the least, the popular impression respecting the amelioration of our climate. On the contrary, it seems evident from Dr. Hale's essay, that from the year 1786 to the year 1829, the climate of the vicinity of Boston has continued essentially the same. It

should be recollected, that in no previous period of equal length were the changes greater, nor more extensive in the face of our country, as well as the condition of its inhabitants, or greater inroads made on our ancient forests.

There is another interesting, as well as important mode of procuring light upon this question of change of climate, namely, by observing for years in succession the periodical changes in the vegetation of our trees and shrubs. It has been observed by the late Mr. Lowell, that "had there been precise records kept of the date of flowering of trees in certain specific locations from the first settlement of the country, very much would have been done for the decision of the whole question as to change of climate." The venerable pear tree of Governor Endicott, had its times of flowering been punctually recorded by its seven successive generations of proprietors, might have put all dispute at rest. We possess no ancient registers of this description kept with the exactness which Mr. Lowell recommended, and which he actually put into practice at Roxbury, through a period of thirty-two years. But we have a similar record kept, on the whole, with great regularity, by the late Rev. Thomas Smith, of Portland, Maine. His diary of the seasons extends, with a few unimportant exceptions, from 1722 to 1786, thus reaching back to a century and a quarter ago. It appears from several observations made by him between the years 1751 and 1773, that the average time of the blossoming of the cherry at Portland during that period, was between the 12th and 13th of May. Mr. Lowell stated that the average at Roxbury, for several years since the commencement of this century, was May 8; and from observations made by Gen. Dearborn in the same city, from 1835 to 1847, inclusive, it appears that this average should be fixed precisely at the same date within a fraction of a day. When we consider that Portland lies north of Boston by more than one degree, these facts, to which many of a similar purport might be added, would seem to form evidence as conclusive as, under the circumstances, could reasonably be expected, against any supposition of a perceptible change in our climate since the settlement of our country. Besides, had such a change occurred to any material extent, we should find some proofs of its existence in what are called our half-hardy plants—that is, plants which are a little, and only a little, too tender to be exposed without protection throughout the year. Could it be shown, for example, that the most beautiful evergreen, the English ivy, which has been cultivated by our florists for more than half a century, could now endure our winters better than formerly, this would furnish a proof of the softening of our climate which it would be difficult to set aside. But we shall search in vain for any instance of this description. Among the many species of trees and shrubs which have been cultivated in our gardens for two or three generations, it may be safely asserted that there is not one which appears to have increased in hardiness. But it may be asked in what way we are to account for the impression that our climate has been growing warmer since the settlement of our country, since neither the existence nor the strength of the impression can in any degree be gainsaid? A sufficient answer has been given by Dr. Hale, namely, that extraordinary seasons are remembered, when the intermediate years

which are not marked by any unusual prevalence of heat or cold are forgotten. As strong instances in confirmation of Dr. Hale's remark, we need only call to mind the repeated references which we find in our annals, and which many of us recollect in the conversation of our predecessors of the last generation, to the long and dreary winter of 1779–80, to which Virgil's highly ornamented description of Scythian cold might be applied with prosaic exactness. Those of us who have passed the middle age, retain an equally distinct recollection of the cold summer of 1816. Both these extraordinary seasons dwelt tenaciously and distinctly in the memory of many who could give no other account, however general, of most other summers and winters of their time. It is not to be doubted that the severe winter which occurred a few years since, when a channel was hewn through the solid ice in Boston harbor, in order to enable the steam vessel to proceed on her regular voyage, will be often appealed to by writers of the next generation as positive proof of the extreme rigor of our winters at the present day.

Impressions of this description are particularly vivid in our younger days. We all can recollect those made upon us by such striking natural phenomena as occurred just within our recollection, and more especially by those of our early winters. When we recall the mountainous snow-drifts, huge icicles, and nipping blasts of those periods, we can hardly realize that any winters of our later days are both equally severe and equally magnificent; and yet all the precise evidence which we possess compels us so to admit. It may be further observed, that the severe winters of the last century have been recollected the more vividly because they were more severely felt than any winter of the same severity would now be. Our people are better clothed, our dwellings better fortified against cold, and, what is of still more moment, our roads are far more quickly rendered passable after heavy storms. A mass of snow, which, sixty years since, might have rendered travelling in our thinly peopled country all but impossible for weeks together, is now cleared away or beaten down in a very few days.

A single extract from Smith's Diary (the work above referred to) will show that former generations had their mild as well as their severe winters. Under date of March 7, 1775, he remarks that the frost seemed out of the ground in the streets of Falmouth, (now Portland,) and this he calls a wonderful winter, and so it would now be considered. It was not, however, unexampled, for Mount, in his relation of the affairs of Plymouth, as quoted in Prince's Chronology, says, under the same date, in the year 1621, "We begin to sow our garden seeds." Had we fuller records on this subject, many more such instances might be brought to light.*

But, unfortunately, such observers as Smith and Holyoke have been at all times rare, though there is every reason to hope that they will be much more numerous in the present condition of the natural sciences.

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* Macgregor, in his elaborate work on the Progress of America, vol. 2, p. 42, observes, "That the Baron La Hontan is recorded to have left Quebec, in 1690, on the 20th of November. He adds that this is as late as any vessel can or will leave that port at present Potrincourt and Champlain, on a Sunday early in January, 1607, sailed in a boat six miles up to Port Royal, (Annapolis, Nova Scotia,) to visit a field of winter wheat, dined in the sunshine, enjoyed music in the open air, &c. No winter since has been milder."

It may be safely asserted, however, that this idea of the gradual softening of our winters finds less and less support in proportion as we descend from general impressions to precise statistics. This is not the only alteration supposed to have occurred in our New England climate. It is a common impression that our summer droughts are more frequent and of longer continuance than formerly. If we could believe that there existed such a tendency in our climate, it would certainly be a most unwelcome conclusion. But the fact may be, not that these droughts are more severe than formerly, but that their effects have become of more consequence, and have been perceived in more ways by our present far more numerous and wide-spread population. To say nothing of these effects as exhibited on a wide extent of cultivated land, they are rendered still more striking in the lowering of the streams which move our factories, and still more of the great rivers through which so much of our vast internal commerce is carried on. But that droughts are, in truth, more frequent and severe in any part of our country at the present day than a century ago, is a proposition for which we find no countenance in any statistics which have come down to us. Smith's Diary is, on this point, an important if not unique document. Though it seems to stand alone, its testimony is as frequent and precise as could be desired in any reason, or as the case could well admit. Years are repeatedly noticed at short intervals as marked by a want of seasonable rains, in language which, though of necessity less precise than a modern register of temperature, is yet altogether distinct and unequivocal. No one can read the diary attentively without a full conviction that long and severe droughts were a hundred years since, as now, the great trial of the patience and confidence of the New England farmer. Thus we find such dry spells noticed as occurring in the following years between 1743 and 1762 inclusive—a period of just twenty years: 1743, 1746, 1747, 1748, 1749, 1752, 1754, 1757, 1761, 1762—being ten years out of twenty.

As we have derived the greater portion of our agricultural knowledge from English writers, and almost all our cultivated plants from English gardeners, we can scarce avoid comparing, at every step, our own climate with that of England, and on the slightest acquaintance with the subject, are struck with the great contrasts which exist between them. These are generally known, and may be stated briefly as follows:

1. Much more rain falls annually in New England than in most parts of Great Britain,* though the impression of common observers is probably the reverse. This difference may be more precisely understood from the following comparison of the fall of rain in twelve months at Chiswick, near London, taken from the registers of the Horticultural Society, and at Cambridge, Massachusetts, as stated from the American Almanac. I have selected, for the first statement, the year 1836,

* I say in most parts of England. We are told, in a prize essay on the English climate (published in the Journal of the Royal Agricultural Society, 1850,) that in some of the western counties, the mountainous district of Cumberland, for instance, fifty, a hundred, or even a hundred and twenty inches of rain sometimes falls in the course of the year. As a general rule, nearly twice as much rain falls on the southwest part of England as in the neighborhood of London.

which seems to have been an uncommonly rainy year in England; and for the second, the twelve months from May, 1847, to May, 1848, merely changing the order of the months. Rain in inches and decimals:

	Chiswick, Eng.	Cambridge, Mass.
January	2.01	2.880
February	1.61	4.000
March	3.30	2.500
April	2.88	1.200
May	1.01	1.935
June	1.66	5.491
July	1.78	2.527
August	1.97	5.215
September	3.81	6.536
October	3.62	1.444
November	3.60	4.940
December	1.48	4.370
	28.73	43.049

Yet nothing is more common than the remark that our climate is a drier and brighter one than that of England; and this is perfectly true. Their rains fall in moderate and drizzling showers, while ours are more violent, and are followed by fair and cloudless days. To this frequency of rainy days, and the great rarity of the blazing weather which we often experience during our summers for weeks together, is England indebted for the deep emerald green of her verdure, which we should in vain strive to imitate. In return, our bright summer suns give us a striking advantage over England in the raising of fruit. The apple, pear, peach, cherry, and plum can be raised in the climate of New England, as far north as Boston, on standard trees. Artificial modes of training are, with very few exceptions, not considered as worth employing, while in a large portion of Great Britain there is not one of those trees, except the apple, which does not require, or at least will not amply repay, such artificial facilities. If Duhamel is right in his unqualified assertion that fruit raised on standard trees is decidedly better than the same fruit raised in any other way—and his authority on the subject of fruit trees is of the highest order—the fruit of this country must surpass that of England in flavor as well as in abundance. Such seems to be the fact, so far as specimens of the fruits of the two countries have been compared, (though it must be admitted that such comparisons have not been very numerous nor thorough,) and such is certainly a probable inference, if we admit the position, to say the least a plausible one, that the juices of all vegetable products derive their highest flavor from the rays of the sun.

2. The temperature of the winter in every part of England is unquestionably much higher than in Massachusetts. With some very rare exceptions—that is, about once in a generation—the zero of Fahrenheit may be considered as the minimum of the thermometer at London. In the year 1830, which seems to have been considered at that

place as an average year, the mean temperature of the following months was:

January	31.75°	February	36.6°
March	48.33	December	35.49

The average temperature of the same months for forty-three years at Salem, Massachusetts, deduced by Dr. Hale from Dr. Holyoke's observations, (Transactions Am. Academy, vol. 1, New Series,) was as follows:

January	25.59°	February	27.75°
March	35.38	December	30.29

Thus we perceive that near London the temperature of the coldest month of the year is barely below the freezing point. Accordingly, we learn that in England proper, the ground is often sufficiently open for ploughing during the whole year—an operation very rarely practicable in the vicinity of Boston during any portion of the months of January or February. As the year advances, this difference of temperature in favor of England disappears, and in the month of May the average heat of the weather in the environs of London and Boston is nearly the same, or about 56°. In the summer months, the excess of heat is on the side of New England, and that to a higher degree than may generally be supposed. Thus, in the summer of the year 1827, which I have selected as an unusually warm one in England, the average height of the thermometer at Chiswick was, in June, 61.7°; July, 67.7°; August, 63.3°; while, according to Dr. Hale, the average temperature of these months at Salem for forty-three years was, by Dr. Holyoke's observations, June, 67.19°; July, 72.49°; August, 70.53°. In September, the excess of heat continued to be on the side of our own climate, and the thermometer generally stands, on an average, about 5° higher with us than at London, and in October the temperature of the environs of Boston and London is very nearly on a level, or at about 52° of Fahrenheit. In November, the balance again inclines in favor of London, the average temperature there being about 43°, and that of our own November about 40°.

Thus it would seem that our autumnal temperature approximates much more nearly to that of England than our vernal, since at the autumnal equinox our temperature is probably a little the higher of the two, while the average heat of the month of March at Salem is about 35°, and that of London may be safely estimated as between ten and twelve degrees higher. From the greater intenseness of our summer's heat and winter's cold, the earth, and consequently the atmosphere, recovers more slowly—so to speak—both from the one and the other, than in England. From this excess of heat in summer, and deficiency of it in winter, in our climate over that of London, it may naturally be conjectured that the one is nearly a counterpoise to the other, and that the average heat of the whole year at London and Boston, and in their respective vicinities, is not very different. Such seems to be the fact, as nearly as such a fact can be ascertained; the average heat of the year at London being estimated at about 49° Fahrenheit, and that of Boston very nearly the same. It results from the greater coldness of

our winters, that our spring begins, on an average, three or four weeks later than in the neighborhood of London; and those who quit England in March or April, and arrive in Boston after a passage of a month, sometimes find the vegetation in the one country precisely at the point where they left it in the other. So thoroughly, as already stated, is the ground cooled by our severe frosts, that it requires the action of the sun for several weeks after the equinox to call our trees into full life. But such is the heat of our May and June, that vegetation, when once fairly started, advances with rapid strides, and by the middle of June our growing season is probably on a level with that of the south of England. We find that many of our fruit trees which blossom, generally speaking, two or three weeks later than those of the same description near London or Paris, ripen their fruit at about the same time. Thus, from observations made for several years near Cambridge, in England, it appears that cherry trees which flowered, on an average, April 14th, ripened their fruit June 27th; by no means an earlier period than with us. All seasons, early and late, says the late Mr. Lowell, are nearly on a level on the 10th of June. "It is familiar to every one, that in Russia and Canada the seasons are as forward as ours by the beginning of July." Mid-summer probably occurs at precisely the same time throughout the whole of the northern temperate zone.

The most striking circumstances, however, which distinguish the climate of every part of our country from that of Great Britain, are our fierce extremes, and the sudden and extensive changes of our temperature. The zero of Fahrenheit has been stated as the minimum of the thermometer at and near London. Putting out of the question, however, extraordinary seasons, this minimum may be fairly placed ten degrees higher. With the same qualification, the greatest degree of cold in the vicinity of Boston may be fixed at about 10° below zero—being 20° lower than the London minimum. This degree of cold is reached or approached in our vicinity almost every year.

We very rarely pass a winter which is not distinguished by a few days of extreme cold, by which is meant days on which the mercury sinks below zero. The number of these days varies, rarely exceeding five or six, and averaging three in a season, and they often occur in immediate succession. Few as they are, they are amply sufficient to test the hardiness of our trees and shrubs; for it is not likely that any plant that could endure two or three days of such weather, would sink under a longer continuance of it. This occasional degree of cold alone would be sufficient to deprive us of many of the shrubs which ornament the gardens of every part of England. But our winters would probably be far less dangerous to vegetable life, if our climate, severe as it is, were more uniform. On the contrary, it deserves any other title. The average range of the thermometer, in the three winter months of December, January, and February, is not less than 60°, while that of a London winter is less than 40°, and the change in the course of one of our winter days sometimes amounts to 30°. The difference between the greatest degree of heat and cold in our spring months, (March, April, and May,) the most critical of the whole year,

so far as vegetation is concerned, is not less, on an average, than 74°. When these facts are considered, it will seem much more surprising that the list of exotics which habitually endure our winters should be so large as it is, than that we should be compelled to exclude from this list so many of the ornamental plants of Europe.

Our extremes of heat are equally striking as those of cold. They occur with equal suddenness and with more frequency. The number of days in each year in which the thermometer rises above 90°—a heat all but unknown in England—is not less, on an average, than 10° annually. These, occurring, as they do, near mid-summer, produce much less effect of a permanent kind upon vegetation than days of extreme cold, and are of little moment to the farmer or gardener, except as they serve to increase our summer drought.

No country, however, is entirely exempted from these extraordinary visitations of severe and changeable seasons, which overleap the usual boundaries of heat and cold; and occurring, as they do, once, perhaps, in a score of years, destroy, in many instances, the growth of a generation. Such a season occurred in England in the winter of 1837, which, for the greatness and suddenness of its changes, might fairly be denominated a New England winter. This resemblance must give additional interest to any full and accurate account of its effects on the vegetable kingdom, and such an account has been given by Professor Lindley, in the London Horticultural Transactions, vol. 2, New Series.

Whether any winter as extraordinary, all things considered, has occurred in New England, we have no sufficient data for ascertaining. The cold summer of 1816 was, however, an instance of equally rare and extraordinary deviation from the usual course of our seasons, and if not unexampled, has certainly been since unparalleled. It is probable that every period of twenty or thirty years has exhibited, with a very few, if any, exceptions, all the varieties of which our seasons are susceptible. Much of this able paper of Professor Lindley is, as might be expected, principally interesting to English gardeners; but there are some deductions which may be drawn from it of a more general character, and applicable to our own or any other climate. Professor Lindley's statements go far to overthrow the position of Mr. Knight, that the English winters have softened during the last century. The thermometer is stated by Lindley to have sunk, in many places of the counties of Kent and Middlesex, from 3° to 13° below zero, and at Chiswick it stood at 4½°. Had Mr. Knight lived to that time, it can scarcely be doubted that he would have seen reason for a great, if not entire, change in his impressions. There is, I believe, no instance on record of a degree of cold materially greater in the southern part of England. This paper clearly shows, or rather strikingly illustrates, the fact that extremes of temperature, *especially those which occur suddenly, and last but a little while*, are often confined within very narrow local boundaries, and that the heat or cold of places within a very short distance of each other may vary exceedingly at any given moment. The temperature of any spot is materially affected by large objects, natural or artificial, within the immediate vicinity; and so great effects are produced by the radiation of heat on the one hand, and by shelter

on the other, that we often find thermometers in different parts of the same city or village, or even of the same garden, differing several degrees. Mr. Daniel states (Horticultural Transactions) that he has known a difference of 30° of temperature between the top of a hill of moderate height and the valley at the foot. Not the least interesting of the facts observed this winter, says Lindley, was this: that in those places where the cold was very severe, the more plants were exposed, the less they suffered, while the more they were sheltered without being fully protected, the more extensively they were injured. Of this he proceeds to give several striking instances. Had he experienced a few of our changeable winters, he would scarcely have thought the fact extraordinary. It seems to be a settled principle, that all tender plants which can bear our winter weather at all, are safer in a northern exposure than any other, and that the winter's sun is, with respect to all those plants which are called half-hardy, far more dangerous than the winter frost.

It is impossible to read Lindley's essay without being convinced that much of the devastation which it commemorates was owing, not to the actual severity of the cold alone, but to the fact that this cold was preceded by an uncommonly warm winter. The cold was certainly such as is rare in any part of England, but in all probability, as Lindley himself intimates, far from unprecedented. But the preceding weather had kept the fluids of the trees in activity, and the sudden check was sufficient to test their powers of endurance to the utmost. Lindley himself does not seem to adopt this conclusion, or, at least, to state it distinctly, but rather to consider the actual degree of cold as the prime and sufficient agent. Doubtless, there is a limit in every exotic to its power of enduring cold, however prepared by the previous state of the weather. But when we find that our hardy ash (*Fraxinus americana*) was severely injured by a temperature of 4½° below zero, while with us it seldom passes a winter without experiencing this degree of cold, and is often called to meet one much more severe, it seems impossible to deny that no injury would have occurred, had not the tree been strongly and unnaturally excited by the previous warm weather.

On the subject of acclimatizing plants—that is, of rendering a tender species hardy by repeated raisings from the seed—Professor Lindley's language is very decided on the negative side. "Acclimating," says he, "in the strict sense of the word, seems to be a chimera," and quotes the bean as a plant which has been raised from the seed in cold climates for centuries, and is still tender. An individual plant, however, may unquestionably be brought, by judicious protection, to endure a climate very different from its own. I have seen two beautiful silver firs flourishing near Savannah, which for some years were regularly screened by close boarding from the summer's sun, till at length protection became unnecessary. This paper of Lindley's is one which, for the precision and fullness of its statements, as well as the fairness of its reasoning, may serve as a model for records of horticultural observations. From many obvious causes, meteorological investigations can serve only to mislead, unless made extensively, repeatedly, and accurately. Thermometers, in this country at least, are seldom

insulated with any care from surrounding objects, or protected from the direct or reflected rays of the sun; and it is only by comparing the statements of many careful observers, that we can arrive even at an approximation to an accurate idea of the temperature of a large district at any given time. Moreover, the observations of the meteorologist must, like those of the astronomer, be continued for ages, before he can hope to discover, to any considerable degree, the mysterious laws which regulate the distribution of heat and cold. To the practical farmer or gardener, indeed, it is of much less moment to discover the causes of the leading peculiarities of our climate than to obviate their effects. One or two suggestions to that effect will close this essay. So far as respects heat and cold, a farmer has but little power over the fierce and sudden extremes of any season, beyond the limits of his frames and green-houses. He can only protect a few favorite shrubs by covering, and choose a proper exposure for his fruit trees.

But there is one striking feature in our climate, the long spells of dry weather, to which allusion has already been made, and the effects of which, no exertions should be spared to alleviate. One of the most obvious remedies would be irrigation. But very few of our farmers have the means at hand for watering their land upon any regular system, to say nothing of the high cost of the labor necessary to apply those means.

Another expedient, which has been little practised hitherto, but which seems fast coming into general use, is the breaking up of the soil to a great depth, more especially by sub-soil ploughing. In countries where labor is cheaper, the same object is effected by the spade, which indeed not only divides the under-soil, but brings it to the surface. But the expense of this course, which in Massachusetts would probably be not less than fifty dollars per acre, would be considered by many an insuperable objection. Besides, if the under-soil is brought to the surface, a heavy expense must be incurred in addition, in the manure necessary to enrich it. The same objections may be made to the enormous trench ploughs used in England, but, it is believed, scarcely known here, which completely reverse the soil to the depth of a foot and a half, and thus place the cold and barren sub-soil uppermost. The only sub-soil ploughs used with us are those which merely split and break up the hard-pan beneath, and thus produce a bed of light earth of about sixteen to eighteen inches in depth. This can be effected in the stiffest soil by a sub-soil plough, with four stout horses, or an equivalent force of oxen, following in the wake of a common plough, and the cost will not exceed twelve or fourteen dollars per acre. When once done, it may be considered as permanent. Every one knows that the hardest ground, when fairly broken up, is loosened for many years, and nothing but the constant travel which takes place in the most frequented streets or roads can restore it to its former compactness for a long period. By this opening of the under-soil, the roots of plants are enabled to shoot downward, and this they will infallibly do when the surface is parched by drought. Besides, every one knows that a heap of loose earth conducts the heat of the sun off much more slowly than a compact mass of hard soil, to say nothing of the superior power which it probably exerts in extracting from the atmosphere its hidden

moisture. If we thus open a refuge to our plants from the fierce rays of the sun, we shall find that none, whether trees, shrubs, grain, or grass, will fail to shoot down their roots, as far as they find the way open.

The next expedient for alleviating the effects of our wearisome spells of dry summer weather is "mulching." This expedient can be practised to much less extent than that just mentioned, and must be a resort rather of the gardener than the farmer. With crops of English grain, it is manifestly impossible, and for field-culture generally impracticable from its expense. But so far as a farmer is a raiser of trees, it may be of the greatest service. Young trees, especially, are not only benefited, but often actually saved, by a cover of leaves or litter of moderate thickness placed round the root to a distance of a few feet. The roots of the tree are thus effectually shielded, and enabled and invited to spread themselves in the soil near the surface, which is, of course, the richest. If we go into a forest or grove, and sweep away the bed of leaves which we find lying round the trunk of a tree, we shall generally find many of the roots actually lying on the top of the ground.

A third expedient, and perhaps the most effectual and useful for obviating the effects of drought, is the frequent stirring of the surface-soil. This can never be done without essential benefit. It would be going quite too far to say that it completely supplies the want of rain; but it is certain that, in some way or other, it produces effects which no one would suppose beforehand, and which no one who has ever attempted to test the point by experiment will ever question. Whoever stirs a few feet of dry soil, will find that it soon changes color and gathers moisture, from whatever source, or in whatever mode. Wherever this measure can be resorted to, which is of course only in places where the plough or hoe can be used, it will be found far more effectual than any other remedy which can be applied with the same amount of labor. The latest and most popular French writer on horticulture points out the mulching and stirring of the soil as the two leading remedies against the droughts which visit all parts of the globe frequently, and our own country in a pre-eminent degree.

As no human power can change our climate, and as there seems no prospect of any amelioration of its severe winters, or its parching droughts, it is an obvious dictate of common sense to select such plants for cultivation, whether annual or perennial, as can best resist its fierce extremes. On this point, little or no information can now be given to the New England cultivators. The experience of two centuries has rendered any precepts unnecessary, and our great agricultural staples are precisely those which, if the choice were now to be made, a wise cultivator would select at the present day. Of these, the best adapted to our climate, as well as our wants, is Indian corn. A few bushels of this grain which had been stored away by the natives, and were found by the Pilgrims before they landed on Plymouth Rock, may be called the first fruits of their new land of promise. Since then, the various merits of this most useful as well as beautiful plant have ever been most justly and wisely appreciated, and the twinkling maize field, as it has been elegantly called by Bryant, has always formed the most striking feature in our field cultivation. Another of our best native poets denominates this vegetable—

"The plumed maize, with shapely blade,
That stands like martial host arrayed."

And certainly no plant of the grain kind stands up more manfully under our fierce summer heats. It only begins to wilt when all our other crops have drooped, and the curling of its thick and glossy leaves is a symptom of a drought of the last degree of severity. For a century and a half its grain, was our chief bread-corn; and though now less in use as sustenance directly for ourselves, it furnishes us with much of our food, as the best grain for fattening animals yet known. But we have only begun to appreciate the value of this plant in another particular, namely, as green fodder.

Its worth, in this respect, was first brought into notice by the late Colonel Pickering, who states that it will yield for this purpose more than ten tons of green food per acre. Still further information on the subject may be found in the valuable pamphlet on "soiling," lately republished by President Quincy.* When our grass is actually burned up by the dry weather—in other words, in half our summers at least—this plant furnishes a complete substitute to our grazing animals, which prefer it to any other food, and in all cases, whether the cattle are fed in the barn or in the field, forms a valuable addition which well repays the labor bestowed in raising and reaping it.

I cannot leave the subject of our New England climate without a word upon its favorable influences on the health of our domesticated animals. Our severe cold, which penetrates to our very fire-sides, has compelled us, from the beginning, to house those animals in the winter, while they doubtless suffer much in other countries, where the winters are sufficiently mild to allow them to be exposed unsheltered without absolute cruelty, and yet not mild enough to enable them to bear such exposure comfortably. The practice, so general in England, for instance, of permitting cattle to remain out during the whole of the year, is justly censured by that eminent agriculturist, our late countryman, Mr. Colman, as a most slovenly and unthrifty one. In our dry summers, too, our sheep and neat cattle seem, in a great degree, exempt from many diseases which prevail in England, and are ascribed principally to the damp weather. We accordingly find that a race of cattle has grown up among us, which, though a very moderate degree of attention has been paid to them on the whole, is highly distinguished by its valuable qualities in every essential particular; and although the importation of valuable foreign animals should by no means be discouraged, it is far from certain that the best mode of improving our domestic cattle is not by careful selections from our own stock. Our New England climate, like every other climate on the globe, often calls forth complaint and criticism from those who live under it; but when we give it due credit for the great variety and importance of the vegetable productions, whether grain or fruit, which can be raised in the greater portion of the States of New England, and for its proverbial healthiness, as respects our farming stock, to say nothing of its far more im-

* President Quincy states, p. 5, that two square rods of land will afford an ample supply of green food per day for each head of cattle, without any additional food. He recommends sowing in drills, at the rate of three bushels per acre.

portant effects in invigorating our farming population, we shall probably allow that it abundantly compensates us, even in an agricultural point of view, for its violent changes, nipping winters, and parching droughts.

PERIODICAL PHENOMENA IN VARIOUS PARTS OF THE UNITED STATES.

Table exhibiting the dates of the opening and closing of the Hudson river, and the number of days open; also, the time of commencement and close of each navigable season of the canals in the State of New York, and the number of days of navigation since 1824; *also, the date of the opening of Lake Erie since* 1827.

Opening and closing of the Hudson river.				Commencement and close of navigation on the Erie canal.			Opening of Lake Erie.
River opened.	Winter.	River closed.	Days open.	Canal opened.	Canal closed.	No. of days of navigation.	Date.
1824, Mar. 3	1824–25	1825, Jan. 5	309	1824, April 30	Dec. 4	219	....
1825, Mar. 6	1825–26	1825, Dec. 13	283	1825, April 12	Dec. 5	238	....
1826, Feb. 26	1826–27	1826, Dec. 24	302	1826, April 20	Dec. 18	243	....
1827, Mar. 20	1827–28	1827, Nov. 25	251	1827, April 22	Dec. 18	241	1827, April 21
1828, Feb. 8	1828–29	1828, Dec. 23	320	1828, Mar. 27	Dec. 20	269	1828, April 1
1829, April 1	1829–30	1829, Jan. 11	286	1829, May 2	Dec. 17	230	1829, May 10
1830, Mar. 15	1830–31	1830, Dec. 25	283	1830, April 20	Dec. 17	242	1830, May 5
1831, Mar. 15	1831–32	1831, Dec. 6	263	1831, April 16	Dec. 1	230	1831, May 8
1832, Mar. 25	1832–33	1832, Dec. 21	289	1832, April 25	Dec. 21	241	1832, April 27
1833, Mar. 21	1833–34	1833, Dec. 13	277	1833, April 19	Dec. 12	238	1833, April 23
1834 Feb. 29	1834–35	1834, Dec. 15	291	1834, April 17	Dec. 12	240	1834, April 6
1835, Mar. 25	1835–36	1835, Nov. 30	268	1835, April 15	Nov. 30	230	1835, May 8
1836, April 4	1836–37	1836, Dec. 7	248	1836, April 25	Nov. 26	216	1836, April 27
1837, Mar. 28	1837–38	1837, Dec. 14	261	1837, April 20	Dec. 9	234	1837, May 16
1838, Mar. 19	1838–39	1838, Nov. 25	257	1838, April 12	Nov. 25	228	1838, Mar. 31
1839, Mar. 25	1839–40	1839, Dec. 18	286	1839, April 20	Dec. 16	241	1839, April 11
1840, Feb. 25	1840–41	1840, Dec. 5	285	1840, April 20	Dec. 3	228	1840, April 27
1841, Mar. 24	1841–42	1841, Dec. 19	286	1841, April 24	Nov. 30	221	1841, April 14
1842, Feb. 4	1842–43	1842, Nov. 28	308	1842, April 20	Nov. 28	222	1842, Mar. 7
1843, April 13	1843–44	1843, Dec. 10	242	1843, May 1	Nov. 30	214	1843, May 6
1844, Mar. 18	1844–45	1844, Dec. 17	278	1844, April 18	Nov. 26	222	1844, Mar. 14
1845, Feb. 24	1845–46	1845, Dec. 3	283	1845, April 15	Nov. 29	228	1845, April 3
1846, Mar. 18	1846–47	1846, Dec. 14	275	1846, April 16	Nov. 25	224	1846, April 11
1847, April 7	1847–48	1847, Dec. 25	263	1847, May 1	Nov. 30	214	1847, April 23
1848, Mar. 22	1848–49	1848, Dec. 27	292	1848, May 1	Dec. 9	223	1848, April 9
1849, Mar. 19	1849–50	1849, Dec. 26	286	1849, May 1	Dec. 5	219	1849, Mar. 25
1850, Mar. 10	1850–51	1850, Dec. 17	282	1850, April 22	Dec. 11	234	1850, Mar. 25
1851, Feb. 25	1851–52	1851, Dec. 14	293	1851, April 15	Dec. 5	235	1851, April 2
1852, Mar. 28	1852–53	1852, Dec. 23	270	1852, April 20	Dec. 16	239	1852, April 20
1853, Mar. 23	1853–54	1853, Dec. 28	274	1853, April 20	Dec. 20	245	1853, April 14
1854, Mar. 17	1854–55	1854, Dec. 8	266	1854, May 1	Dec. 3	217	1854, April 29
1855, Mar. 19	....	....	.....	1855, May 1	....	.....	1855, May 4

Periodical phenomena of certain trees, plants, and animals, deduced from Institution,

Places.	General period of flowering of the peach.	General period of flowering of the cherry.	General period of flowering of the apple.	General period of flowering of the red maple.	General period of flowering of the dogwood.	General period of flowering of the strawberry.	Flight of wild geese northward.
Augusta, Ill	April 5	....	April 20	....	....	April 5	....
Baldwinsville, N. Y	May 11	....	May 18	April 6	....	....	....
Brattleboro, Vt	May 16	....	May 16	....	June 3	May 1	....
Brest, Mich	April 23	....	May 18	May 5	May 18	....	....
Ceres, N. Y	May 14	....	May 14	May 27	....	....	....
Chatham, N. Y	....	....	May 14	April 7	May 28	....	....
Chapel Hill, N. C	Feb. 27	....	....	....	April 19	....	....
Chester, Pa	April 5	....	May 2	....	May 12	....	....
Dubuque, Iowa	May 10	....	May 11	Mar. 28	....	....	....
Eutaw, Ala	....	....	....	....	Mar. 21	Mar. 21	....
Fleming, Pa	....	....	....	April 2	May 15	May 2	....
Fort Madison, Iowa	April 26	....	April 24	....	....	....	....
Fort Snelling, (near,) Min	....	....	May 25	April 15	....	....	....
Genito, (Diamond Grove,) Va	Mar. —	....	Mar. —	Mar. —	Mar. —	....	....
Keene, Ohio	Mar. 30	....	April 13	Mar. —	May 12	....	....
Lebanon, Tenn	Mar. 16	....	April 8	Mar. 30	April 25	....	....
Madison C. H., Va	....	....	April 15	April 4	April 30	....	....
Manchester, N. H	May 8	May 16	May 20	....	....	May 12	....
Meadville, Pa	April 15	....	May 6	April 1	May 23	....	....
Milwaukie, Wis	April 26	....	May 14	April 1	May 24	....	Mar. 28
Nazareth, Pa	April 15	....	April 22	April 25	May 15	....	....
Newark, N. J	April 15	....	April 25	....	....	....	....
New Lebanon, N. Y	May 10	....	May 16	April 20	May 18	....	....
New Wied, Texas	Feb. 28	....	....	....	....	....	....
North Salem, N. Y	April 10	....	May 13	April 1	May 10	....	....
Ogdensburg, N. Y	....	....	May 20	April 24	....	....	....
Plattsburg, N. Y	....	....	May 15	May 1	....	....	....
Richmond, Ind	April 2	....	....	Feb. 15	....	....	....
Sag Harbor, N. Y	April 29	....	May 13	April 10	....	....	....
Saint John's Parish, (Black Oak,) S. C	Feb. —	....	Mar. 25	Feb. —	Mar. 15	....	....
Sikesville, Md	April 1	....	April 20	Mar. 28	May 5	....	....
Somerville, N. Y	....	....	May 21	April 30	....	....	....
Steuben, Me	....	....	May 25	May 26	....	....	Mar. 27
Westchester, Pa	April 1	....	May 1	Mar. 28	May 15	....	....

observations made in various places, under the direction of the Smithsonian in 1851.

First appearance of the barn swallow.	First appearance of the whip-poor-will.	First appearance of the salmon.	First appearance of the shad.	First appearance of the herring.	First appearance of the sturgeon.	First appearance of the fire-fly.	Names of observers.
....	....	....	....	....	....	May 12	S. B. Mead.
....	....	....	....	....	....	....	John Bowman.
....	June 3	....	....	....	....	June 3	John L. Russell.
....	May 3	....	....	....	....	May 16	Thomas Welpley.
May 9	....	....	....	....	....	May 25	R. P. Stevens.
May 7	May 11	....	....	....	....	June 15	Cornelius Chase.
....	....	....	....	....	....	April 27	James Phillips.
....	....	....	Mar. 10	....	....	May 26	George Smith.
....	....	....	....	....	....	May 16	Asa How.
....	....	....	....	....	....	....	A. Winchell.
....	....	....	....	....	....	....	J. M. McMinn.
....	May 12	....	....	....	....	May 23	Daniel McCready.
....	....	....	....	....	....	....	
....	....	....	Mar. —	....	....	April 27	R. F. Astrop.
....	....	....	....	....	....	May 17	E. C. Bidwell.
....	....	....	....	....	....	April 27	A. P. Stewart.
....	....	....	....	....	....	....	A. G. Grinnon.
....	....	April 1	....	May 1	....	....	S. N. Bell.
May 7	....	....	....	....	....	June 1	Professor Williams.
....	....	....	....	....	....	June 20	J. A. Lapham.
....	....	....	....	....	....	June 2	E. T. Kluge.
....	....	....	Mar. 2	....	....	June 11	W. A. Whitehead.
....	....	....	....	....	....	....	Joseph Bates.
....	....	....	....	....	....	....	J. C. Ervendberg.
April 28	....	....	....	....	....	May 26	J. F. Jenkins.
April 7	....	....	....	....	April 18	June 15	W. E. Guest.
....	....	....	....	....	....	....	W. C. Belcher.
....	....	....	....	....	....	June 15	W. W. Austin.
....	....	....	....	....	....	....	Ephraim N. Byram.
....	....	....	Feb. —	....	....	Mar. 25	H. W. Ravenel.
....	....	....	....	....	....	May 17	Miss H. M. Baer.
....	....	....	....	....	....	June 1	J. B. Hough.
May 2	....	....	....	....	....	June 27	J. D. Parker.
....	....	....	....	....	....	....	Wm. Darlington.

Periodical phenomena of certain trees, plants, and animals, deduced from Institution,

Places.	General period of flowering of the peach.	General period of flowering of the cherry.	General period of flowering of the apple.	General period of flowering of the red maple.	General period of flowering of the dogwood.	General period of flowering of the strawberry.	Flight of wild geese northward.
Ann Arbor, Mich	May 24	....	May 24	....	....	May 25	....
Athens, Ill	April 29	....	May 3	Mar. 20	....	April 13	Feb. 23
Augusta, Ill	May 1	....	May 1	....	....	May 1	Feb. 7
Baldwinsville, N. Y	May 17	....	....	May 2	....	....	....
Belle Centre, Ohio	May 7	....	May 7	Mar. 17	May 20	May 12	....
Boston, Mass	May 12	....	May 23	May 1	....	....	....
Burlington, N. J	May 1	....	May 12	....	May 16	April 26	Mar. 15
Camden, S. C.	Mar. 1	....	Mar. 17	Mar. 7	Mar. 29	Mar. 29	....
Castine, Me	....	....	June 3	May 5	....	June 10	....
Ceres, Pa	May 30	....	May 20	May 20	....	May 27	Mar. 15
Chatham, N. Y	May 16	....	May 23	May 1	....	May 4	....
Cincinnati, Ohio	....	....	....	....	....	....	....
Constableville, N. Y	....	....	....	....	....	....	....
Darby, Pa	May 12	....	May 8	April 12	May 10	....	April 14
East Windsor Hill, Conn.	....	....	May 25	....	....	....	....
Easton, Pa	May 7	....	May 11	....	....	May 9	....
Eutaw, Ala	Feb. 27	....	Mar. 14	Feb. 26	Mar. 15	Mar. 20	Jan. 24
Flatbush, N. Y	May 7	....	May 12	....	May 29	May 7	....
Fort Madison, Iowa	....	....	May 1	....	....	April 30	Feb. 7
Fort Ripley, Min	....	....	....	....	....	May 21	April 10
Freeport, Pa	May 5	....	May 7	April 30	May 17	....	Mar. 8
Germantown, Pa	....	....	April 29	....	May 7	....	....
Gettysburg, Pa	May 2	....	May 10	April 9	....	May 9	....
Genito, Va	Mar. 14	....	Mar. 25	Feb. 5	April 8	April 5	Mar. 3
Hagerstown, Md	April 25	....	May 2	Mar. 25	May 14	....	....
Hollidaysburg, Pa	May 7	....	May 11	April 10	May 28	May 13	....
Indiana, Pa	May 11	....	May 12	April 26	May 23	May 21	Mar. 10
Keene, Ohio	May 6	....	May 12	April 6	May 14	....	....
Knox Hill, Fla	Feb. 6	....	Mar. 10	Feb. 7	Feb. 26	....	....
Knoxville, Tenn	Mar. 13	....	Mar. 26	Mar. 3	April 10	April 12	....
Lebanon Springs, N. Y	....	....	May 10	April 8	....	....	....
Londonderry, N. H	May 22	....	May 27	May 6	....	May 20	Mar. 20
Madison C. H., Va	April 13	....	April 10	Mar. 18	May 10	April 26	....
Manchester, N. H	May 18	....	May 25	May 8	....	May 20	Mar. 20
Meadville, Pa	May 13	....	May 20	April 22	May 29	May 15	Mar. 9
Mercersburg, Pa	May 6	....	May 6	April 16	....	May 6	....
Middletown, Conn	May 10	....	May 20	April 19	May 27	May 5	Mar. 12
Middletown, (near Lima,) Pa	April 30	April 30	May 10	Mar. 29	....	....	....
Mossy Creek, Va	April 10	....	April 30	Mar. 18	May 10	Mar. 1	Mar. 1
Newark, N. J	May 6	....	May 15	....	....	....	....
New Wied, Texas	Feb. 15	....	....	Feb. 15	....	....	....
North Attleboro', Mass.	May 10	May 8	May 21	April 26	June 1	May 5	Mar. 14
North Salem, N. Y	May 6	....	May 15	April 26	....	May 7	....
Ogdensburgh, N. Y	....	....	....	May 6	....	....	....
Orwigsburg, Pa	May 7	....	May 15	April 25	....	....	Mar. 8
Plattsburg, N. Y	....	....	May 28	June 4	....	May 19	....
Portsmouth, Va	Mar. 18	....	Mar. 29	....	....	May 15	....
Radnor, Pa	....	May 12	....	Mar. 26	May 15	....	....
Reading, Pa	April 9	April 16	April 21	Mar. 22	May 12	April 18	....

observations made in various places, under the direction of the Smithsonian in 1852.

First appearance of the barn swallow.	First appearance of the whip-poor-will.	First appearance of the salmon.	First appearance of the shad.	First appearance of the herring.	First appearance of the sturgeon.	First appearance of the fire-fly.	Names of observers.
....	April 15	....	....	....	....	June 2	Lum Woodruff.
....	....	....	....	....	....	May 29	Joel Hall.
May 5	....	....	....	....	....	May 22	S. B. Mead.
April 28	....	....	....	....	....	....	John Bowman.
Mar. 30	....	....	....	....	....	June 1	Robert Shields.
....	June 1	....	....	....	....	....	John L. Russell.
....	....	....	April 10	April 10	May 15	June 31	Adolph Frost.
....	....	....	Feb. 24	....	April 15	May 2	J. A. Young.
May 1	....	April 27	April 29	....	....	....	Joseph L. Stevens.
April 28	....	....	....	....	....	June 2	R. P. Stevens.
May 1	....	....	April 10	April 20	April 20	June 4	Cornelius Chase.
....	....	....	....	....	....	June 8	John Lea.
May 1	....	....	....	....	....	....	L. L. Fairchild.
Mar. 14	....	....	....	....	....	June 2	John Jackson.
....	....	....	....	....	....	....	P. A. Chadbourne.
....	....	....	....	....	....	June 11	Professor Coffin.
....	April 14	....	....	....	....	Mar. 22	Alexander Winchell.
....	....	....	....	....	....	June 15	Johh L. Zabriskie.
May 3	April 26	....	....	....	....	May 27	Daniel McCready.
May 6	....	....	....	....	....	....	J. F. Head.
April 13	....	....	....	....	May 13	June 18	Andrew Roulston.
April 16	....	....	....	....	....	June 15	L. Groneweg.
....	....	....	....	....	....	June 11	M. Jacobs.
....	Mar. 30	....	Mar. 8	Mar. 1	....	May 10	R. F. Astrop.
April 15	....	....	....	....	....	May 27	John H. Heyser.
....	....	....	....	....	....	....	J. R. Lowrie.
....	....	....	....	....	....	....	David Peelor.
....	....	....	....	....	....	....	Miss P. D. Childs.
....	....	....	....	....	....	....	J. Newton.
....	....	....	....	....	....	April 28	O. W. Morris.
May 10	....	....	....	....	....	....	Joseph Bates.
May 2	May 26	....	....	....	....	June 8	Robert C Mack.
....	....	....	....	....	....	....	A. G. Grinnon.
May 5	....	....	....	....	....	....	S. N. Bell.
May 1	....	....	....	....	....	June 13	L. D. Williams.
....	....	....	....	....	....	June 14	Thomas C. Porter.
....	....	....	May 1			....	John Johnston.
....	May 3	....	....	....	....	June 2	Minshall Painter.
April 10	....	....	....	....	....	May 25	J. Hotchkiss.
....	....	....	....	....	....	June 21	W. A. Whitehead.
May 8	....	....	....	....	....	....	L. C. Ervendberg.
Mar. 28	May 6	....	....	....	....	June 15	Henry Rice.
April 29	....	....	....	....	....	June 5	John F. Jenkins.
April 9	....	....	....	....	April 20	....	W. E. Guest.
April 25	April 28	....	....	....	....	....	J. S. Keller.
April 18	....	....	....	....	....	June 20	W. C. Belcher.
....	....	....	....	....	....	May 8	N. B Webster.
....	....	....	....	....	....	....	J. Evans.
....	....	....	....	....	....	....	

Periodical phenomena of certain trees,

Places.	General period of flowering of the peach.	General period of flowering of the cherry.	General period of flowering of the apple.	General period of flowering of the red maple.	General period of flowering of the dogwood.	General period of flowering of the strawberry.	Flight of wild geese northward.
Richmond, Mass	....	....	May 27	May 10	....	....	Mar. 10
Rochester, N. Y	May 8	....	May 15	April 19	May 20	....	....
Saint John's Parish, (Black Oak,) S. C	Feb. 25	....	Mar. 25	Jan. 29	Mar. 21	....	....
Sag Harbor, N. Y	May 10	....	May 22	April 26	June 3	....	Mar. 15
Sikesville, Md	April 30	....	May 2	Mar. 25	May 16	April 30	Mar. 21
Smithfield, Va	Mar. 9	....	Mar. 15	Feb. 25	....	....	....
Steuben, Me	....	....	June 1	May 6	....	May 30	Mar. 19
Trenton, Mo	....	....	....	....	....	April 22	....
Upper Darby, Pa	May 8	....	May 12	April 9	May 23	May 10	....
Valley Forge, Pa	....	....	May 8	....	....	May 10	....
Washington, Mich	May 12	May 11	May 25	....	....	....	....
Waterloo, N. Y	May 13	....	May 24	....	....	May 17	....
West Point, N. Y	May 14	....	May 16	April 20	June 3	May 20	Mar. 26
Wewokaville, Ala	Feb. 27	....	Mar. 12	....	April 20	Mar. 25	Feb. 1

plants, and animals, in 1852—Continued.

First appearance of the barn swallow.	First appearance of the whip-poor-will.	First appearance of the salmon.	First appearance of the shad.	First appearance of the herring.	First appearance of the sturgeon.	First appearance of the fire-fly.	Names of observers.
May 20	....	....	....	....	....	June 30	W. Bacon.
....	....	....	....	....	....	....	C. Dewey.
....	....	....	....	....	....	....	H. W. Ravenel.
....	....	....	....	....	....	....	E. N. Byram.
April 26	....	....	....	....	....	May 24	Harriot M. Baer.
....	....	....	Mar. 4	....	April 2	....	John R. Purdie.
May 14	....	....	....	....	....	June 30	J. D. Parker.
....	....	....	....	....	....	....	John M. Ordway.
April 23	....	....	....	....	....	June 1	George Smith.
....	....	....	....	....	....	....	C. P. Jones.
April 28	....	....	....	....	....	June 18	Dennis Cooley.
April 17	....	....	....	....	....	....	A. E. Bishop.
April 27	June 1	....	April 18	....	....	June 8	John Bratt
....	April 8	....	....	....	....	Mar. 22	Benjamin F. Holly.

Periodical phenomena of certain trees, plants, and animals, deduced from Institution,

Places.	General period of flowering of the peach.	General period of flowering of the cherry.	General period of flowering of the apple.	General period of flowering of the red maple.	General period of flowering of the dogwood.	General period of flowering of the strawberry.	Flight of wild geese northward.
Aiken, S. C	....	....	....	Mar. 18	April 1	....	....
Ann Arbor, Mich	....	....	May 9	....	May 25	....	April 7
Ashtabula, Ohio	April 23	....	May 6	April 26	May 13	....	May 10
Athens, Ill	April 22	....	April 28	Mar. 27	....	April 30	During winter.
Augusta, Ill	April 22	....	May 2	....	....	April 22	Feb. 23
Brandon, Vt	....	....	May 26	April 27	....	May 14	....
Burlington, Vt	May 22	....	May 28	April 28	....	....	....
Chapel Hill, N. C	Mar. 19	....	April 10	Mar. 5	April 17	April 8	....
College Hill, near Cincinnati, Ohio	April 10	....	April 23	April 1	May 9	May 10	....
Crichton's Store, Va	Mar. 13	....	April 15	Mar. 12	April 11	April 6	Mar. 12
Darby, Pa	April 14	....	April 29	....	May 9	April 20	....
East Windsor Hill, Conn	April 25	....	....	April 10	....	May 12	Mar. 15
Flatbush, N. Y	April 21	....	April 19	....	May 17	....	....
Fort Madison, Iowa	April 20	....	April 29	....	....	May 13	Jan. 21
Francistown, N. H	May 7	....	....	....	....	May 15	....
Freeport, Pa	April 26	....	May 2	Mar. 23	May 18	....	April 8
Germantown, Ohio	April 17	....	April 25	....	May 3	....	....
Gettysburg, Pa	April 20	....	May 6	April 7	May 20	April 28	Mar. 23
Glenwood, near Clarkville, Tenn	April 4	....	April 13	....	April 30	April 14	....
Grand River College, Mo	April 26	....	April 29	....	....	April 24	....
Hagerstown, Md	April 15	....	May 1	Mar. 25	May 14	May 22	....
Hollidaysburg, Pa	April 28	....	May 4	April 10	May 20	May 4	Mar. 9
Lac qui parle, Min	....	....	....	May 3	....	May 25	Mar. 23
Lima, Pa	April 17	April 22	May 1	Mar. 24	May 4	May 2	....
Londonderry, N. H	May 14	....	May 21	April 25	....	May 12	Mar. 17
Maysville, Ky	April 15	....	April 23	April 9	April 25	....	Feb. 12
Middletown, Conn	May 4	....	May 14	April 8	May 24	May 10	....
New Lebanon, N. Y	May 8	....	May 14	April 26	May 25	May 2	Mar. 26
New Wied, Texas	Mar. 8	....		....	....	....	Mar. 21
Nichols, N. Y	....	....	May 18	....	....	....	....
Ogdensburg, N. Y	....	....	May 16	April 23	....	....	April 1
Radnor, Pa	....	....	May 4	Mar. 26	May 9	April 28	....
Rochester, N. Y	May 8	....	May 20	April 6	June 5	May 15	....
Sikesville, Md	April 9	....	April 27	April 1	May 5	April 21	Mar. 20
St. James, Mich	....	....	....	May 7	....	June —	April 9
Steuben, Me	....	....	May 29	May 8	....	May 12	April 6
Stockbridge, Vt	....	....	May 26	May 26	....	May 18	....
Upper Darby, Pa	April 22	....	May 8	April 4	May 18	April 30	....
West Point, N. Y	April 29	....	May 14	April 27	May 20	May 9	....
Wewokaville, Ala	Mar. 15	....	April 10	Mar. 25	April 6	Mar. 20	....

observations made in various places, under the direction of the Smithsonian in 1853.

First appearance of the barn swallow.	First appearance of the whip-poor-will.	First appearance of the salmon.	First appearance of the shad.	First appearance of the herring.	First appearance of the sturgeon.	First appearance of the fire-fly.	Names of observers.
							H. W. Ravenel.
April 13							Miss Mary H. Clark.
May 6	May 4						J. C. Hubbard.
						June 1	E. Hall.
Mar. 30						May 22	S. B. Mead.
April 28							D. Buchland.
April 29							Z. Thompson.
April 21						April 9	K. P. Battle.
							A. Wood.
	April 14		Mar. 16	Mar. 16	Mar. 1	May 1	R. F. Astrop.
April 12			Mar. 12			May 27	J. Jackson.
April 21			April 6			April 13	P. A. Chadbourne.
April 28							Jeremiah S. Zabriskie.
Mar. 20	April 17					June 18	Daniel McCready.
May 10						June 18	H. E. Sawyer.
April 10						June 16	A. Roulston.
						June 4	L. Groneweg.
							M. Jacobs.
	April 13					April 18	W. M. Stewart.
						May 25	John M. Ordway.
April 9						May 23	John H. Heyser.
							J. R. Lowrie.
April 1							Alfred L. Riggs.
	April 17					May 28	M. Painter.
April 22						June 2	R. C. Mack.
April 16					May 15	June 7	E. L. Berthoud.
April 23			Mar. 30	April 1		June 4	John Schuster.
April 27						June 6	Joseph Bates.
						Feb. —	L. C. Ervendberg.
April 20							Robert Howell.
							W. E. Guest.
							John Evans.
							C. Dewey.
April 25						May 21	Miss H. M. Baer.
				All the year.	All the year.		James J. Strong.
May 4							J. D. Parker.
April 8						June 14	W. C. Belcher.
			Mar. 12			May 27	George Smith.
		May 15	April 14	April 29	May 1	May 29	John Brath.
	April 6					Mar. 31	B. F. Hackley.

Periodical phenomena of certain trees, plants, and animals, deduced from *Institution,*

Places.	General period of flowering of the peach	General period of flowering of the cherry.	General period of flowering of the apple.	General period of flowering of the red maple.	General period of flowering of the dogwood.	General period of flowering of the strawberry.	Flight of wild geese northward.
Athens, Ill	April 20		April 22				Feb. 11
Augusta, Ill	April 19		April 20				Feb. 12
Belle Center, Ohio	April 22		May 1		May 10		
Castleton, Vt			May 20	May 10			Mar. 12
Canonsburg, Pa	April 18	April 20	May 7				
Cleveland, Ohio	April 26		May 11	April 20	May 21		Mar. 10
Easton, Pa	May 3		May 8	April 13	May 2		
Easton, Md			April 18	Mar. 10	April 30		
Fort Madison, Iowa	April 19		April 20				Feb. 19
Freeport, Pa	April 24		April 23	April 11	May 17		Mar. 5
Germantown, Ohio	April 10		April 21		April 28		
Gettysburg, Pa	April 20		May 1	April 5	May 10	April 28	Mar. —
Hannibal, Mo	April 11		April 21				During winter.
Lac qui parle, Min			April 17	April 24	May 26	May 12	
Lancaster, Pa	April 10		May 1				
Lima, Pa	April 8		April 25	Mar. 18			
Manchester, N. H	May 12		May 20	May 1			
Mendon, Mass	May 14		May 21	May 1			Mar. 9
Middletown, Conn	May 10		May 19	April 12	May 28		Mar. —
Mt. Healthy, Ohio	April 10		April 15		May 3		
Newbury, Mass	May 1	May 10	May 18				
New York City	May 7		May 8	April 25	May 16		
New Wied, Texas	Feb. 15				April 15		
North Attleboro', Mass	May 12		May 16	April 23	May 26		Mar. 17
Ovid, N. Y	May 19		May 21	April 20	May 20		April 10
Pleasant Plain, Iowa	April 20		April 25	April 1			Mar. 1
Poland, Ohio	April 24		May 12	April 8	May 16		
Poultrey, Iowa						May 15	Mar. 12
Pyne Springs, (near Nashville,) Tenn	April 8		April 8				
Radnor, Pa	April 22		May 5	Mar. 17	May 13		
Rochester, N. Y	May 15		May 20	April 20	May 29		Mar. 10
Salmon Falls, N. H	May 20	May 19	May 25	May 7		May 20	
Sikesville, Md	April 5		April 26		May 11		
Somersworth, N. H			May 21	May 15		May 19	April 15
Steuben, Me			June 6				Mar. 17
The Grove, Ill	May 10		May 11				Mar. 1
Trenton, Mo	April 16		April 25			April 22	
Tuscaloosa, Ala	Mar 20		April 1		April 1	April 1	
Upper Darby, Pa	April 24		May 7	April 1	May 15		April 7
Uxbridge, Mass	May 18		May 20		May 24		
Williamsville, N. Y	May 10						

observations made in various places under the direction of the Smithsonian in 1854.

First appearance of the barn swallow.	First appearance of the whip-poor-will.	First appearance of the salmon.	First appearance of the shad.	First appearance of the herring.	First appearance of the sturgeon.	First appearance of the fire-fly.	Names of observers.
....	April 12	....	....	....	....	May 29	Elihu Hall.
April 1	May 4	....	....	....	....	May 24	S. B. Mead.
April 22	April 22	....	....	....	....	May 26	Robert Shields.
April 25	May 15	....	....	....	....	....	D. Underwood.
....	....	....	....	....	....	....	Wm. Smith.
....	....	....	....	....	April 22	July 11	J. Kirkpatrick.
....	....	....	....	....	....	June 2	Students, L. C.
April 10	June 1	....	Mar. 4	Mar. 10	....	June 1	S. T. Rodgers.
April 9	....	....	....	....	....	May 20	Daniel McCready.
April 11	May 10	....	....	....	....	June 17	A. Roulston.
April 21	....	....	....	....	....	June 5	L. Groneweg.
April 28	....	....	....	....	....	June 3	M. Jacobs.
....	April 12	....	....	....	....	....	O. H. P. Lear.
....	....	....	....	....	....	....	Alfred L. Riggs.
....	....	....	....	....	....	May 29	Thomas C. Porter.
....	April 27	....	....	....	....	....	M. Painter.
April 25	....	....	....	....	....	....	S. N. Bell.
April 27	May 12	....	....	....	....	....	John G. Metcalf.
....	....	....	....	....	....	May 22	John Johnston.
April 25	May 10	....	....	....	....	....	Carlos Shepard.
....	....	April 2	....	....	....	....	Wm. Little.
....	....	....	....	....	....	....	O. W. Morris.
....	April 4	....	....	....	....	....	L. C. Ervendberg.
April 5	May 13	....	....	April 11	....	June 7	Henry Rice.
....	May 18	....	....	....	....	June 10	Wm. H. Brewer.
....	April 10	....	....	....	....	May 19	T. McConnel.
April 21	....	....	....	....	....	....	
....	....	....	....	....	....	....	B. F. Odell.
....	....	....	....	....	....	....	
....	....	....	....	....	....	....	John Evans.
....	....	....	....	....	....	....	C. Dewey.
....	....	....	....	....	....	....	G. B. Sawyer.
Mar. 15	April 26	....	....	....	....	May 23	Miss H. M. Baer.
....	....	....	....	....	....	....	H. E. Sawyer.
May 10	....	....	....	....	....	June 19	J. D. Parker.
April 24	April 25	....	....	....	....	....	R. W. Kennicott.
....	....	....	....	....	....	May 23	John M. Ordway.
....	....	....	....	....	....	....	Benj. Whitfield.
April 9	....	....	....	....	....	May 29	George Smith.
....	June 21	....	....	....	....	....	James W. Robbins.
April 10	....	....	....	....	....	....	Wm. Van Pelt.

Harold Barch, in his ingenious dissertation on the "Foliation of Trees," informs us that Linnæus, of Sweden, in the most earnest manner, had exhorted his countrymen to observe, with all care and diligence, at what time each tree expanded its buds and unfolded its leaves; imagining, not without reason, that his country would some day or other reap some new and perhaps unexpected benefit from observations of this kind made in different places. As one of the apparent advantages, he advises the prudent husbandman to watch with minute attention the proper time for sowing; because, this produces plenty of provisions, and lays the foundation of the public welfare of the State, and of the private happiness of the people. The incredulous or obstinate, tenacious of the ways and customs of their ancestors, fix their sowing season generally to a month, and sometimes to a particular week or day of that month, or even to the age of the moon or the state of the tide, without considering whether the earth be in a proper condition to receive the seed; from whence it frequently happens that what the "Sower sowed with sweat, the reaper reaped with sorrow."

The wise economist should therefore endeavor to fix upon certain signs whereby to judge of the proper time for sowing. For instance, we see trees open their buds and expand their flowers or leaves, from whence we conclude that the approach of spring is at hand, and experience supports us in the conclusion; but who has as yet been able to show us what trees Providence has intended should be our best calendar, in order that we may know with certainty on what day we are to sow our seed? No one can deny that the same power which brings forth leaves and flowers will also cause the vegetation of grain; nor can any one assert that a premature sowing will always, and in every place, accelerate a ripe harvest. Perhaps, then, we cannot promise ourselves a happy success by any means so likely as by taking our rule for sowing from the flowering and leafing of trees. With that end, we must observe in what order the principal trees of a particular district put forth, according to their species, the temperature of the atmosphere, and the quality of the soil. Afterwards, by comparing the observations of the several years, it would not be difficult to determine, from the inflorescence and foliation of trees, if not with certainty, at least probably, the time when annual plants ought to be sown. It will be necessary, likewise, to note what sowings, made in different periods of the spring, produce the best crops, in order that, by comparing these with the leafing or flowering of trees, it may appear which is the most proper time.

The temperature of the season, with respect to heat and cold, drought and wet, differing every year, experiments made one year cannot with certainty determine for the next. They may assist, but cannot be conclusive. The hints given by Linnæus, therefore, constitute a universal rule, as trees and shrubs bud, leaf, flower, and shed their foliage in every country according to the difference of soils, exposures, and seasons, but in most instances uniform as to their succession, being bound down by Nature herself. There is a certain kind of genial warmth which the earth should enjoy at the time the seed is sown. The budding, leafing, and flowering of plants seem to indicate this happy temperature.

A farmer, therefore, who would adopt the sublime idea of Linnæus, should diligently mark the time of budding, leafing, and flowering of different species of plants. He should also note down the days on which his respective seeds were sown; and by comparing the two tables for a series of years, he would be enabled to form an accurate guide for sowing his grain or planting his corn. An attention, also, to the change in the coloring of the autumnal foliage and the fall of the leaf, would assist in sowing his winter grain, and teach him how to guess at the approach of winter.

The state of the seasons, from year to year, may also be determined to some extent by the appearance or departure of certain species of birds of passage, reptiles, fishes, &c. For instance, swallows (*Hirundo rufa*) constantly arrive in New England from southward about the middle of April. Wild geese (*Anser canadensis*) fly to the northward early in March, and return southward about the middle of September. Wild pigeons (*Columba migratoria*) begin to appear in their passage northward at the end of February and the beginning of March. They return southward about the end of August. Mackerel, a high latitude fish, usually set in to the coast about the second week in May; and a second setting in takes place in autumn; but a few are caught during the summer. They generally disappear early in July, or at least will not take the bait. This fish is not found far south of New England. The salmon (*Salmo salar*) is also another high latitude fish, which is not found south of the Hudson. The farther southward the locality, the later they set in, and the shorter the time they remain. For instance, in the Hudson they appear about the middle of May, and continue only a week or ten days; in the Connecticut, in the beginning of the same month, and run about three weeks; in the Merrimack they set in the beginning of April, and lie in the deep, cold brooks and other tributaries to spawn until September or October; then, silently and with despatch, return to the sea. In Chebucto, Cape Breton, and the waters about Newfoundland, they continue the greater part of the year. It may here be remarked that the salmon, shad, ale-wives, and herrings are not so plentiful as formerly in the waters of New York and New England, which is probably owing to the erection of dams and other obstructions across the streams.

To those who have leisure and taste for inquiries of this sort, and possess the requisite instruments for making accurate observations, I would suggest that they direct their attention to the following phenomena, and record the results in some suitable form, either for publication or their own private use:

First, in respect to *climate*—the maximum, minimum, and mean of the barometer, hygrometer, and thermometer, at some open situation in the shade, unaffected by accidental influences; the amount of rain and snow; direction and extent of summer rains or showers, as well as of winter storms; the months in which tornadoes, hail, and thunder occur; the direction and extent of the two former, with the amount of damage done to crops and other property; the character of the lightning, and the kind of trees and other objects most frequently stricken thereby; the periods of drought, and its effects on vegetation, animals, and streams; the period of closing the ground by frost, the depth to which it freezes

in the coldest months, and the time of opening in the spring; the occurrence of cracking or bursting of the ground by frost, and the length and breadth of the chasms, with the character of the soil thus affected, whether clay, gravel, sand, or loam; the period of closing and opening of harbors, lakes, and streams; fluctuation of rise and fall of said rivers, whether by tides or other causes; maximum thickness of the ice; phenomenon of the explosion or bursting of the ice on lakes; periods of latest spring or earliest autumnal frosts, and names of the plants checked or injured in their growth by the same; mean monthly and annual temperature of wells and springs; face of the sky and class of clouds, and number of fair days; prevailing winds; infallible signs, if any, for the prediction of the weather or seasons; occurrence of rainbows, halos, or perihelia about the sun or moon; the aurora borealis, and of meteors or shooting stars, with the general direction of the latter; occurrence of earthquakes and land-slides, their geographical limits, direction, and velocity, with the amount of damage done to animals, crops, or other property; the effects of the climate of your locality on animals, in respect to their organization, health, diseases, or capability to labor.

Second, in respect to *vegetation*—the general period of sowing and planting in the open air; frondescence, or leafing, or when the buds first open, and exhibit the green leaf; general period of flowering, or time of expansion of the real flower, or when the anther first makes its appearance; period of maturity, or when ready for harvesting—that is, when the pericarp first bursts spontaneously in dehiscent* fruits or seeds, or when indehiscent ones are fully ripe; defoliation, or fall of the leaf, or when the leaves are nearly all shed; average yield in quantity of seeds, roots, fruits, &c., grown on a given space of ground; the occurrence of blight, mildew, or rust, in grain or other plants.

Third, in respect to certain *animals*—the time of their appearance in spring and disappearance in autumn, whether from migration or hybernation; their periods of moulting or shedding their coats, whether natural or by the aid of man; periods of bringing forth their young; duration of pregnancy or incubation; and the number of young produced to each litter or birth.

Persons wishing to prosecute inquiries like the above will be furnished with printed directions and blank schedules, on application to the Commissioner of Patents, Washington, District of Columbia.

D. J. B.

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* *Dehiscent* signifies gaping or opening naturally by seams—an expression applied to the manner in which the anther, pericarp, or fruit bursts open, and discharges its contents or seeds. *Indehiscent* signifies the reverse.

ON THE NATURE, CAUSES, AND EFFECTS OF ATMOSPHERIC ELECTRICITY.

[Condensed from the American Almanac of 1854 and 1855, from the pen of Professor Joseph Lovering, of Harvard University.]

If we allow ourselves to be instructed by the analogies of the friction electrical machine, the Leyden jar, or the Voltaic battery, we shall find that the essential condition for maintaining a charge of electricty, is the existence of two bodies or portions of the same body (which are generally conductors) separated from each other by a non-conducting medium. An electrical charge implies the presence of two bodies in opposite electrical states; and the well-known attraction mutually exerted by two such bodies would lead soon to a discharge, if they were not separated by the insulating medium. There is no reason why the solid earth should not play the part of one of these bodies, while the other is represented by the upper regions of the atmosphere or by the clouds floating therein. As the surface of the solid earth is separated from the region of clouds by the non-conducting air, an electrical charge may be maintained by the earth on the one hand, and by the clouds on the other, and this charge will be limited in intensity only by the dryness of the intervening air. Thus the whole earth resembles a Leyden jar, or more exactly, on account of the large distance between the clouds and the earth, an electrical machine, in which the rubber is removed from the prime conductor by a larger space than that which separates the two coatings of the jar, and in which, therefore, the electricity is more free than in the jar.

Observation shows that this electrical charge which the planet is capable of sustaining, it generally does sustain to a greater or less degree. As every change in the condition of matter, whether mechanical, physical, or chemical, places it in the electrical state—as heat, both directly and by leading to combustion and evaporation, provokes this electrical state—we are at no loss for exciting agents which shall give to the earth and clouds the whole or a part of the electricity which they are designed to hold.

With regard to the character of electricity, it may be said that the earth is generally charged negatively, and the atmosphere positively; the intensity of the positive charge increasing with the elevation of the stratum observed. Any discrepancies between observers in respect to this point may be referred to local action. Peltier has proved the negative character of the solid earth, as compared with its atmosphere, by means of the galvanometer. One end of the multiplier was joined to a pointed rod of metal and raised into the air, the other end being soldered to a metallic plate which was buried in the earth. As the electricity under examination possesses considerable tension, the strand of the multiplier must be insulated from each other with unusual care. Sturgeon found the electricity of the air most positive during the cold northeast winds of March Weekes observed that the electricity was strong when there was a breeze from the eastward. Cuthberton states that he always found the electricity of the air positive. Crosse, on the

other hand, thought the air was always negative. Davy, too, in his Agricultural Chemistry, seems to imply that the air is negative. In some of the observations, probably, the requisite precautions were not taken to guard against deception. Pine cautions the observer against making his experiments near a tree. The free electricity of the air, positive in character, and increasing with the elevation of the spot observed, is not found in the interior of buildings. The air of rooms, vitiated by respiration, is negative according to Murray. He also states that the air at Orbitello and in the Pontine marshes is negative. The most intense charge is observed in open places, such as quays, bridges, and squares. In such localities as Geneva, where low fogs prevail, it is particularly intense. A persistent series of systematic observations in electrical meteorology may perhaps bring these discordant and anomalous results of observation into harmony with each other. It is no small part of the difficulty, that the instruments which report of the electrical state of the air, may, like those which measure its temperature, or its moisture, or its winds, respond more promptly to local than to general influences, and so give an uncertain sound, instead of registering that state, as the barometer registers the physical element to which it is adapted, in its most general character. A series of daily observations made by Schübler, at Stuttgard, from May, 1811, to June, 1812, in all kinds of weather, may throw some light upon the subject. He reached the following results: 1. The charge of electricity is more intense in storms of rain, or hail, or snow, than when the sky is fair. 2. At such times the charge is as often negative as positive. 3. The character in this respect often changes suddenly. 4. In cloudy weather, without any storm, the charge is positive. 5. The intensity of the charge is greater in winter than in summer. Schübler also studied the electrical phases of the atmosphere at different periods of the day, and discovered some correspondence between the diurnal variation of the magnet and the daily curve of electrical intensity. The minima of intensity occurred before sunrise, and again two or three hours after noon, and the maxima two or three hours after sunrise and after sunset. The range of the daily change increased from July to January, and decreased from January to July. In 1830, Arago repeated at Paris the same series of observations on the daily curve, and with similar results.

As a body becomes positively charged only at the expense of another which loses electricity, and is therefore negatively charged, the electricity of the air and of the clouds, whether, in fact, positive or negative, implies the existence of an opposite charge in the earth itself. The solid earth, with its atmosphere, has the same average fund of electricity always. There is no proof that it ever borrows electricity of foreign orbs, or makes to them a loan of its own. The phenomena under consideration are purely meteorological, and not cosmical. It is by a change in the distribution of this normal quantity of electricity that one part of the planet acquires an excess while another is deficient. But it is not so easy to prove, by direct experiment, that the earth is negatively charged, as to draw down and handle the positive electricity of the clouds. The unequal amount of evaporation in different parts of the earth's surface, and a partial distribution of moist winds,

will produce charges of electricity in the air much larger at some places than at others, and the imperfect conducting power of the air will be unfavorable to a speedy equalization. On this account the electricity of the air will be in a large sense of a local character. The opposite and corresponding charge of the solid earth will more easily spread over its whole surface. With the ample range thus afforded to its own inherent diffusiveness, it will retain only a feeble power at any one place. It is not surprising, therefore, that the electrical charge of the solid earth is rarely recognised by the senses. Sometimes, and in some places, geographical locality may be opposed to an immediate diffusion of the electricity, so that, if the exciting cause is active, a sufficient charge may accumulate to attract attention. In such cases, the electricity, following so far as it can spread the usual laws of distribution, will concentrate its forces around the sharp peaks of mountain-tops, which are the natural and appointed dischargers to the planet. Hence positive clouds are seen to congregate as if by electrical attraction around this pinnacled battery of the earth. The electricity of the earth shows itself, if at all, by a brush or star of light on pointed objects resting on the earth and projecting into the air. The records of these displays have accumulated with years, and are found in the literature and common language of every age and country. The ancients distinguished them by the name of Castor and Pollux. In modern times, and around the shores of the Mediterranean, they are hailed as the light of St. Claire, St. Nicolas, St. Helena, and elsewhere they bear the appellation of St. Barbe or St. Elmo. The Portuguese call them "Corpo Santo," and the English "Comazants." These lambent flames, as they appear, have been seen blazing from the summits of the Himalaya and Cordillera mountains. They are frequently seen tipping with fire the masts and spars of ships. We are told that in the voyage of Columbus, as soon as St. Elmo appeared with his wax tapers, the sailors began to sing, thinking that the storm was over. The electricity of the earth, while in the act of discharging itself into the air, has been seen edging with light the manes of horses, the metal trimming of their harness, the lashes of whips, the brims of hats, the tops and edges of umbrellas, the sharp points of swords and lances, the extremities of hair and whiskers, the corners of chapeaux, the buttons upon the coat, filaments of straw, the beaks of birds, and the myriad needle-like terminations of vegetable growth, with that incomparable point and finish which they took from Nature's own hands. In 1778, these electrical brushes embellished the crosses upon the steeples in Rouen, as well as other points of eminence. At the siege of Kingsall, in 1601, the sentinel saw electrical tapers burning on the points of lances and swords. Guyan says that they are often noticed on the bayonets of the soldiers at Fort Gowraya, Bougie, 2,200 feet above the level of the sea. During a thunder-storm they have appeared like the work of induction, gleaming upon the points of the fire-arms in the armory of the Tower of London. In Poland, Captain Bourdet was astonished to see, in December, 1806, the electrical glow upon the ears of the horses, on the metallic knobs of their harness, and on the whiskers of the troops. On the 25th of January, 1822, the tops of the trees at Freyburg were touched with light during a snow-storm. In 1824, a load of straw became animated,

and danced the electrical hop, each straw standing on end and shining at the top. In 1825, Sir William Hooker and a party of botanists, who were upon Ben Nevis, shed the electrical light from their hair when they lifted their hats. In May, 1831, the hair of the officers at Algiers stood erect, decked out with fire. Walker, the English electrician, on the 8th of September, 1842, saw the same light on the top of his own lightning-rod. On the 17th of January, 1817, an extensive snow-storm was experienced in Maine, Vermont, Massachusetts, and even in Pennsylvania and Georgia. Professor Cleaveland says that upon this occasion three persons crossing the bridge over the Androscoggin observed the borders of their hats to be luminous, and the ends of their fingers, though covered with gloves, were radiant with light. Professor Dewey, of Williamstown, relates that, upon the same occasion, a physician saw the light upon the ears and hair of his horse. A gentleman tried to brush it from his hat, thus reminding one of the sailor who was sent to the top-mast to bring the fire of St. Elmo down. In both cases, the experiment was attended with the same success. The light spread more widely for being disturbed. Other persons witnessed the same brightness on the trees, fences, and logs. It was reported that a hiss was heard when the hand was presented to these objects. Moreover, the lightning was frequent. A young man in Vermont described the phenomenon after this wise: It appeared as a star or spark oftener than as a brush. A sound could be heard at the distance of six or eight feet resembling that of water in a tea-kettle just before it boils. The effect was greater on high ground than on low, so that the light was then seen on the hat and shoulders. The brush was sometimes two inches in length and three-quarters of an inch in diameter. To spit was, to emit from the mouth a luminous stream of fire. At Shelburn, Massachusetts, a similar light was seen upon a well-pole; when the end came down, the light disappeared, and was kindled again when it went up. Arago mentions other cases where the spit was luminous, and one at least has come within my personal observation at Cambridge. In 1767, Tupper and Lanfiar observed, near Mount Etna, that, by moving their hands through the snowy air, they produced sounds which could be heard at the distance of forty feet. In 1781, Saussure, the great Alpine observer, felt a cobweb sensation among his fingers, and his attendants were able to draw sparks from a gold button on his chapeau. The beaks of birds have appeared luminous during storms; and it has been suggested that the eagle, "by some pre-eminence in this respect, acquired its cognomen of the minister of the thunderbolt." We may introduce here an experience of Sabine and James C. Ross, during an arctic voyage, as indicating possibly the electrical condition of the earth or air. They entered a luminous track about four hundred metres long, and while in it, they could see the tops of their masts, the sails and cordage of their ship, and when they left it they passed suddenly into outer darkness.

Arago has collected, with amazing industry, passages from the classics which may possibly contain allusions to the electrical light. Thus Cæsar, in the African war, says that the lances of the fifth legion seemed on fire during a night of hail-storms. Livy states that the javelin of Lucius Atreus cast forth flames for two hours without being

consumed. Plutarch records the fact that when the fleet of Lysander was on the point of attacking the Athenians, Castor and Pollux arose, and stood on the two sides of the gallery of the Lacedemonian admiral. He refers to similar observations in Sardinia and Sicily. Pliny had seen just such lights on the points of the soldiers' pikes. Seneca alludes to a star which reposed on the iron part of the lance of Gylippus near Syracuse. And then there was the fire around the head of Ascanius.

In reference to the manner in which the earth becomes charged with electricity, it may be observed that there are three dynamical processes, very general and efficacious, which are going on at all times with greater or less violence in the air, all of which probably are concerned in the production of the electricity we observe in it, namely: 1. Evaporation; 2. The friction of the wind; and 3. Combustion. As early as 1749, Franklin had a theory that electricity was produced by evaporation, and in a way which had some resemblance to Black's theory of specific heat. When water evaporates, it requires a greater capacity for electricity as well as for heat. The electricity and heat, essential to the physical change of state, involved in the transition of matter from a liquid to a gaseous state, must be abstracted from surrounding bodies, which are thus cooled and left, electrically speaking, negative. As the vapor rises with its latent charge of heat and positive electricity, it finally reaches a region of cold, where it is again condensed, and the electricity and heat become free again, and make some demonstration. Thus, if Franklin had reasoned by strict analogy, he would have made the charge of the clouds positive, whereas at this time, he was under the impression that they were negatively electrified. In 1767, he had come to the opinion that the vapor is often positive. In the meanwhile—that is, in 1752—Nollet had made experiments upon evaporation. In 1782, Volta published his experiments upon electricity as a product of evaporation, especially that which he made by a mixture of water, sulphuric acid, and iron filings, in the presence of Laplace and Lavoisier. Saussure and Bennet also experimented on the evaporation of various liquids and from various vessels. They remark that the *kind* of electricity developed in the vapor was often anomalous. Saussure suggested that in some cases a chemical decomposition of the liquids might take place, or perhaps even of the vessel, which disguised the genuine result of evaporation. Pouillet, who has gone largely into the subject of the origin of atmospherical electricity, has come to the conclusion that the material of the vessel which holds the evaporating water has much influence, and that pure distilled water develops no electricity by evaporation; and that the saline or other impurities which water generally contains are in some way essential for the production of electricity by evaporation. If, says Bird, common salt be put into the water which is passing into vapor, the vapor acquires positive electricity at the cost of the vessel, which is negative. If, on the other hand, an acid is mixed with the water, the vessel takes the positive charge, and the vapor goes up with a deficiency of electricity. Peltier has made many experiments upon the subject, and finds, as he thinks, something besides evaporation to be necessary to the production of electricity, and something the conditions of which can hardly be found in ordinary evaporation. It is proper,

also, to add this fact, given by Pouillet, that Lemonnier discovered electricity in the air every day for six weeks between the middle of September and the end of October, 1753, although the season was very dry, and no clouds were seen. On the other hand, to prove that evaporation developed electricity, Rowell and Spencer made an experiment which showed that, where electricity was cut off by insulation, the evaporation was retarded. For this purpose, they put the same weight of water into two vessels, one of which was insulated, and the other connected with the ground by conductors of electricity, and they always found that the latter lost the most by evaporation. I will give the following method of Howard for showing the electricity of evaporation: "To the cap of a gold-leaf electroscope, I affixed a horizontal support for a candle, which projected two feet from the cap of the instrument, placed near the edge of a table; on the floor, immediately beneath, was an earthen vessel containing hot water an inch in depth. The candle being lighted, two or three hot coals were dropped into the water, so that there rose a sudden cloud of vapor. The electricity of this being collected by the candle, the leaves of the electroscope opened and struck against the sides."

Another cause of atmospherical electricity, and the one upon which Reiss particularly insists, is friction. Faraday shows, by experiment, that dry air rubbing against dry air, or against some other substance, would be inaction in respect to electricity. But moist air grinding against the hills, the trees, the rocks, would acquire a positive charge of electricity. The friction of two masses of moist air driven by opposite currents against one another might charge each, though with different kinds of electricity, and to a less degree than where the two rubbing bodies are more heterogeneous. Kaemtz, the distinguished meteorologist, relies on the efficacy of friction—of friction between strata of air differing in temperature as well as moisture, of which the coldest, and therefore generally the highest, takes the positive charge. In elucidation of this point, I may refer to the discovery by Armstrong, in 1840, of hydro-electricity, as it is called. When high-pressure steam issues from a boiler through a stop-cock, lined, for instance, with partridge-wood, electricity is abundantly produced; the steam and water being charged positively, and the boiler negatively. The elaborate experiments of Faraday have clearly shown that the cause of the electricity in this case is friction—not the friction of the steam, but of the liquid particles mixed with the steam—against the inside of the pipe. Dry steam will not answer. Hence the apparatus makes provision for cooling and condensing, by a circuitous channel artificially chilled, a part of the steam before its escapes, so that it may contain the particles of water which do the rubbing. The steam itself is the mechanical power which works the electrical engine. The hydro-electric machine accordingly differs from the ordinary friction machine for producing electricity, incidentally in employing steam power instead of manual labor to work it, but essentially in selecting drops of water and wood for rubbing in place of glass and the usual amalgamated rubber. Leave now the workshop and the laboratory, and go out into the broad atmosphere; substitute for the working power of steam that of the wind, and you have a hydro-electric machine of Nature's own

handiwork, and upon a magnificent scale. I will offer only two further remarks concerning friction, as one of the contracting parties for forging the glittering artillery of the clouds: 1. As friction of the air is inoperative without moisture, evaporation in the last analysis is to be thanked for the electricity which friction produces. 2. As the friction of moist air, as it is driven before the wind, must be one cause, if not the only or the principal cause, of atmospherical electricity, have we not some elucidation of the thunder and lightning which accompanies many moist storms, and makes so dazzling a part of the retinue which marches in the track of the tropical hurricane and the tornado everywhere?

Vegetation and combustion must not be omitted in making a catalogue of the sources of atmospherical electricity. Pouillet inferred, from experiments, that the oxygen which plants give out by day is charged with negative electricity, and that a surface of one hundred square metres in full vegetation produces as much electricity in one day as the largest Leyden battery can contain. Kaemtz lays some stress on combustion as a generator of atmospherical electricity. The carbonic acid gas carries off with it possible electricity.

This experiment of Matteucci may have some applicability to the subject. He insulated a metallic plate of three square feet, covered with earth and salt; as soon as the sun acted upon it, the gold leaves of an electroscope connected with it diverged.

After it has been proved that an assigned cause is of the right kind in quality, the demands of a rigid science are not satisfied, unless it is also shown that it is of sufficient force in quantity. In the case under consideration, it may be difficult to do all this. It may be difficult to calculate from such data as exist how much electricity is concentrated on the average in the atmosphere at any one time for which an account is to be rendered; and it may be no more easy to estimate correctly the producing power of evaporation, friction, and their co-operatives. There are few of the mechanical operations of nature which can be brought within the limits of strict mathematical investigation. The precision and delicacy of finish, united with great boldness of conception, which are claimed for astronomy, belong only to the mechanics of the solar system, and this, which is called the higher mechanics, is considered piece-meal. It has not yet entered into the mind of man to conceive of that highest and truly celestial mechanics which metes out the forces ordained to balance and move, not merely planets and comets, but stars, clusters, and nebulæ. Here it is the multiplicity of the stars which swarm in space, and the unnatural and parallactic crowding in certain districts, which make the confusion of thought. In meteorology, and indeed on many an arena of nature infinitely smaller than the earth's atmosphere, there is the same multitude of objects, and the same ambiguity in their position; and, besides all this, there is a variety of forces which cut in at various points besides the force of gravitation, and there also exist an irregularity of figure and a crowding of parts in the matter concerned, which contrast widely with the almost spherical units and the ample spaces of astronomy. To walk even in one of the narrowest paths of meteorology, who can compare numerically the quantity of electricity which diverges the tell-tale

leaves of the gold-leaf electroscope and that which fills the Leyden jar, and then who can compare the quantity in the jar with that in the thunderbolt, and afterwards say how many such thunderbolts strike upon a certain assignable area of the earth's surface, and how much electricity besides this discharges silently and steadily upon the mountain-peaks, the million tree-tops, and the innumerable natural lightning-rods which point ever to heaven, and preserve the earth from frequent and violent electrical excitement, by bringing the electricity back harmlessly to the earth? And to account for the existence of so much electricity, after its value has been accurately ascertained, who can calculate, from the electricity which the evaporation of a drop of water contributes to the sky, how much ascends from the earth's waters? And who will undertake to calculate the friction of the winds and the electricity which they grind out?

Beccaria, who was one of the first to follow the lead of Franklin in pursuing the study of atmospherical electricity, estimated that as much electricity passed through the rods on the palace of Valentino every hour as was sufficient to kill three thousand men. Arago estimated that, when a cloud was present, a hundred sparks would pass a break in a lightning-rod in ten seconds, and this would be enough to kill a man; enough, therefore, to kill three hundred and sixty men an hour. In respect to evaporation, Leslie computes that 52,120,000,000 cubic feet of water, each weighing about sixty-two pounds, are lifted 18,000 feet into the air by evaporation each minute. Now, if the evaporation of a drop of water develops electricity sufficient to throw apart the gold leaves of the electroscope, who can say that the whole fund of evaporation, which is mechanically equivalent to 200,000 times the labor of the working population of the globe, may not be competent for all the requirements of electrical meteorology? In respect to the effects of atmospheric electricity, there are some meteorologists who, in their discussions and theories, have entirely overlooked its agency; while there are others who have exalted the electrical force into the first rank, and placed them in the van of the great movements in the atmosphere. Both of these views, in my opinion, are at variance with the truth. The electrical forces are not to be despised on the one hand, nor, on the other, to be enthroned above every other influence. The statistics of meteorology are various, and are collected for various purposes. But the most important questions of meteorology, considered as a science, relate to motion. The statical aspect of this science is valuable as showing when equilibrium cannot exist, and where there must be motion, and how much motion there must be. The phenomena of meteorology are emphatically those of change and transition. The dynamical side of the problem contemplates the laws of these changes and the origin and character of the forces which produce them. The degree of change and its direction are conveniently gauged and registered by the difference in the barometric height at the same moment for two places, or for the same place at two successive periods. But the cause of the oscillations in the barometer, and of the motions which are measured by them, is to be found in a disturbance of the mean temperature or humidity, or both, of the air, a disturbance originating, in each case, directly or remotely, in the action of the solar rays.

While evaporation is going on under the provocation of the sun, and while the winds are blowing in virtue of moisture and of heat, both the winds and the evaporation produce electricity. This electricity acts by its own laws of attraction and repulsion, and produces motions, which combine, according to the established principles of mechanics, with the other motions which heat immediately causes; or one of the effects of heat—that is, gravitation disturbed by vapor. If we take a glass-plate electrical machine and suppose it to be turned by a windmill, instead of by manual strength, and if we apply the electricity which it generates to almost any mechanical purpose, we shall see that it would do much less execution than the wind itself which was spent in producing the electricity. Or, if we examine the dydro-electric machine—the boiler of a locomotive, for instance—we discover that it can generate large sums of electricity, surpassing, perhaps, all that we have ever seen produced artificially. Collect, now, the electricity which this maximum of art produces, husband it carefully, and dispose it so as to exert to the best advantage its mechanical power, and how much work can it do compared with the locomotive which generated it? If it were harnessed by any artifice, however skilful, to the heavy train of freight which the locomotive hardly fails to press upon its Herculean shoulders, would it not be utterly crushed by it? Hence we infer that, in meteorology, the work, while it is done by electricity, is small in comparison with that which is done by the heat, acting through the wind and moisture, which sets free this electricity. And if it were otherwise—if heat could act with more economy through the medium of electricity than through that of elasticity or gravity, or through any other medium, would a thorough analysis of the phenomena of meteorology be satisfied with stopping at the electrical forces? Would it not, finally, come to the sun's heat as the prime mover and disturber? So it would appear that, although the phenomena of meteorology are limited to this planet, the cause is cosmical and not meteoric.

Without regarding electricity as the exclusive or even the principal force which manifests itself in meteorology, we may refer certain classes of phenomena to its more particular agency. Of this description is the aurora. The great evaporation of the aurora, in many cases, might require us to consider it as without the pale of meteorology, did we not expand the limits of the earth's atmosphere, and therefore the limits of the science which treats of it, beyond the region of twilight to a spot as distant as any which gives indications of the existence in it of any substance affiliated with the grossest matter of the earth. Now, the relation which has been observed to hold between the direction of the dipping-needle at any place and the vanishing-point of the auroral beams, indicates a dependence of the aurora on terrestrial magnetism; that is, upon an inseparable property of the earth. Again, it is supposed that the clouds do not shine entirely by the light of the sun, but that they are themselves, to a small degree, self-luminous. In proof of this, Mr. Spencer alleges the case of an astronomer who could not see to read his time by bright starlight, but was able to do it after the heavens were overcast with clouds. Now, it has been suggested that these instances of phosphorescence in clouds are the effects and

the tokens of their electricity. The meteoric wonders of luminous rain and snow may indicate a high charge of electricity in the air breaking out into a glow. In other cases, as, for instance, in the moon, the planets, and the comets, where it is known that these bodies shine eminently by reflected light, that small amount of independent light which they may emit from a sort of phosphorescence, is liable to be overlooked and overdrenched in the superior brilliancy of other lights; but these independent rays, where they exist, may be nice traces of electricity.

There are motions among the clouds which are probably caused by the electrical attractions and repulsions. It is no uncommon sight to behold clouds moving contrary to the wind, and also sometimes in different directions, with respect to one another.* This is properly explained, in many cases, by saying that different currents prevail at different heights, and each cloud obeys, like a balloon, the current in which it happens to be at the time. But it is impossible that the clouds should be electrified, as they sometimes are to a high degree, without exerting their electrical attractions and repulsions, and thus producing motions which may modify, and perhaps materially, such other motions as the winds may start. On the 14th of June, 1842, it was observed that the focus of a thunder-storm in England followed the course of the Thames. There, the electrical forces seemed to impress their own character upon the direction of the motion. The clouds acted by induction upon the earth, and particularly upon those parts which conduct the electricity best, and prepared the way for the attraction which guided their own course.

Another way in which electricity may influence the atmospherical movements is this : When the particles of air are electrified, they tend to fly asunder, as the pith-balls hanging upon the prime conductor of the electrical machine. This tendency of the particles to separate, adds to the expansive force of the air, and is equivalent to so much additional heat. A large amount of electricity set free at one place, may give a strong explosive force to the air, and produce in this way very grand effects, though they will be local and ephemeral in their character. But in a general view of meteorology, this mode of action cannot be paramount to all others. For when it is considered that heat, acting by one or another agency, produces the electricity which is in the air, it can hardly be believed that a given amount of heat expended in producing electricity, and, as a consequence of electricity, new expansion, can be of more avail than the same amount of heat if exerted directly on the air to expand it.

Faraday once made a remark, based upon his own experiments,

* A remarkable phenomenon of this sort was observed by me on my second ascent of the Peak of Teneriffe in September, 1833. In passing through a dense stratum of clouds, several hundred feet in thickness, small currents of air traversed portions of the thick mist in which I was enveloped with unequal velocities and often from opposite points, waving the shrubs and ferns in a very singular manner. Sometimes these currents moved in circular and tortuous directions. The same thing was noticed thirty-four years before by Baron Humboldt, under similar circumstances, near the same spot. "The causes of this partial motion of the clouds," he observes, "are probably very various; we may suppose it to rise from some impulsion at a great distance; from the slight inequalities of the soil, which reflects in a greater or less degree the radiant heat; from a difference in temperature kept up by some chemical action; or perhaps from a strong electric charge of the vesicular vapors.—D. J. B.

which is often quoted and sometimes misconceived, to this effect: that a grain of water gives out, by its chemical decomposition, as much electricity as might charge a thunder-cloud. Hence many exclaim, philosophers and those who are not—How immense the *quantity* of electricity in a drop of water! We might with as good reason cry out—How insignificant the quantity of electricity in a thunder-cloud! And, indeed, if electricity be in reality a fluid, as we at present are constrained to conceive it, the grand effects which are unquestionably produced by it, as those of the thunderbolt, are attributable to the incomparable freedom, elasticity, and, consequently, the immense velocity of the fluid, and not to the quantity, which may be no greater than that which binds the oxygen and hydrogen of a particle of water, and which, if gradually set free, is insignificant and almost imperceptible. There may be other local effects besides these, seen where lightning has struck, as, for instance, the ravages of the tornado, which are the work of electricity suddenly accumulated and bursting as suddenly out before it has had time quietly to discharge itself by the ordinary channels. In the convulsions of the air, and even of the solid earth, in earthquakes, volcanic eruptions, and hurricanes, electricity finds a congenial atmosphere, and contributes to swell the force of destruction. But even here, while it makes its own mark on the phenomena, it is itself the effect of many antecedents, and can be no larger or more terrific than the forces which have been expended in producing it. These other forces, it is true, by taking the guise of electricity, may acquire a degree of centralization and a facility for instantaneous action which do not belong to their own sluggish nature.

Thus, in various ways, such as have been already described, electricity is ascending from the earth to the air, or, in other words, the electrical equilibrium holding between the earth and its atmosphere is destroyed. Even while the accumulation is proceeding, some effects, as the electrical attraction and repulsion and the motions which follow, are produced by these forces, the release of which from the usual balance is the essence of electricity. But in the course of time, the clouds will be electrically overloaded, and the forces of which I wrote will be so strengthened by constant reinforcement as to compel a return to equilibrium. The influences which carry up the electricity into the air cannot hold it there. This must be left to the insulating power of the air itself, which is generally very imperfect. In dry states of the air, the electricity must wait till it is strong enough to break down in luminous beams through the dry air, revealing its motion possibly at these times by the tremulous flashes of the aurora. Sometimes, its passage from cloud to cloud is bridged across by the moisture, or its descent to the earth is made very easy by the columns, or rain-drops, or snow-flakes. But whether it creeps slyly from place to place, or dashes boldly along, as in the lightning, the most important disturbances are produced by the electricity of the atmosphere, as well as electricity in general when it is in motion, when it is hurrying back to the haunts from which it was enticed. Then it burns, blazes, storms, and tears; then it convulses and sometimes kills. Manifest pains has been taken by the Author of nature to keep down all electrical excesses. The

lightning which kills suggests most forcibly the Merciful Hand which generally spares. Even if we are not able to decide whether the development of electricity is incidental merely to other atmospheric movements, or whether it is a most important object of them, certain it is that electricity is crowding into the air, and in quantities that would threaten all the time, did not Infinite Wisdom provide in more ways than one an escape for the redundant energy, and, ages before Franklin planted on the earth the first lightning-rod to catch the destructive fluid as it poured down, make the earth bristle all over with his divine protection.

As to the physical cause of thunder and lightning, considered as the visible tokens of electric discharge, Aristotle remarks: "We, however, say that the same nature *upon* the earth is wind, but *in* the earth is an earthquake, and in the clouds is thunder." Arago has defined thunder and lightning as a phenomenon or meteor which is exhibited when the heavens are covered with clouds, and which manifests itself first by light and then by noise. I will not dwell upon the fanciful distinctions on this subject made by the Etruscans, renowned as they were in the ancient world for their knowledge of these things. Pliny divided lightnings into public and private. He also distinguished between those which came from the stars and those which rise out of the earth. But Aristophanes, in the "Clouds," ridicules the idea that thunder ever comes from the earth.

Regarding thunder and lightning as an atmospheric phenomenon, revealing to man's senses the violent discharge of electricity between one cloud and another, or between the earth and a cloud, I proceed first to inquire into the peculiarity and height of thunder-clouds. Arago mentions, as one peculiarity, a kind of fermentation, which Foster compared to that of cheese when full of maggots. Peytier and Hossard, while engineering upon the Pyrenees, observed that even when the clouds were smooth underneath, they were often rough above.

The effects of the lightning's stroke have been found on the highest mountains. Humboldt recognised them in South America; Saussure discovered them on Mont Blanc; Ramond, Peytier, and Hossard met them on the summits of the Pyrenees; and Bouguer and Condamine on the Cordilleras. But it is not safe to presume that thunder-clouds reach as high as the effects of their explosion; for the lightning may strike from a lower cloud *up* to a higher peak as well as downwards. There is a church in Styria, standing upon a prominent mountain-top. On May-day, 1700, a physician at that place noticed a dense black cloud below him; the sky above was a clear blue, when a flash of lightning ascended from the cloud, struck the church, and killed seven persons. Murray says he has seen lightning ascend in a spiral line.

But even if it were admitted that the height of thunder-clouds is coequal with the marks of lightning, it would still be necessary to inquire whether thunder-clouds rise to that height in level countries. To answer this question, resort is had to an observation of the interval which elapses between the flash and the report. But unless the angular elevation of the cloud above the horizon is recorded, and is taken into the account, the observation gives, and can only give, the distance

of the cloud from the observer, and not its *perpendicular elevation* above the earth's surface. And this distance is correct only on the supposition that the sound is made *in* the *cloud*, and not along the whole line of discharge. Subject to these corrections, a large number of illustrative cases, compiled by Arago, may be used to answer the question in regard to the height of thunder-clouds, and to show an extreme height of 26,500 feet. On the 5th of July, 1788, Saussure and son had a thunder-storm above them, although their tents were pitched in one instance 3,471 metres, and in another 4,500 metres, above the level of the sea. On one occasion, Massena and Suwarrow were fighting a battle on the St. Gothard, in clear sunlight, while Nature's artillery, in the shape of a thunder-storm, was exploding below them. If, therefore, the effects of lightning, and lightning itself, are known to exist on high mountains, and even above their surface, frequently, if not generally, thunder-clouds are much nearer the sea, and sink often to distances not exceeding 1,000 feet above the earth's level surface.

Aristotle, Lucretius, Pliny, and Seneca, all have sought curiously into the nature of lightning. Seneca says: "Fire is produced by the percussion of flint and steel, or by the friction of two pieces of wood. It may happen, therefore, that the clouds, hurried away by the winds, are likewise inflamed by means of percussion and friction." The "Clouds" of Aristophanes embodies the same idea.

Lightning and thunder are the momentary effects produced by the passage of atmospherical electricity, as the common electrical spark and snap betray the ordinary discharge of electricity from an artificial electrical machine. It is not necessary, therefore, in this connection, to ask how or why it is that the light marks the path of the lightning so plainly, that this effect has come even to designate the cause which produces it.

The flashes of lightning which we see are indications of the passage of electricity, sometimes between a cloud and the earth, but more frequently from cloud to cloud. Gay-Lussac determined the length of the flash to be sometimes three miles in extent. The electricity is restrained upon a cloud as upon the prime conductor of an electrical machine, not by the pressure of the air, but by its non-conducting character. When it is considered that a large prime conductor will not collect and retain electricity sufficient to give a spark more than two or three feet in length, it is wonderful, if not inexplicable, how the lightning can dart from the cloud over such spaces. Leslie believed it to be carried, by a process analogous to the convection of heat, by the vapor itself in its descent. If it is not carried by convection, but by common conduction, the particles of moisture or rain may compose a chain of communication from point to point. Hence the lightning strikes to the ground more easily after rain; and whenever it strikes before rain, it is because it has extraordinary force, and so on such occasions it causes unusual havoc. Gay-Lussac makes a distinction between electricity on a cloud, and electricity on the prime conductor of an electrical machine.

An interesting question may be started at this stage of the inquiry, namely: Whether lightning always starts from the cloud towards the

earth and never leaves the earth to go to the cloud? It would be impossible to answer this question, either in regard to lightning or artificial electricity by direct observation; because the fluid passes so rapidly over the longest spaces that its whole track will be illuminated at once. Still, individuals think sometimes they can see the flash start, and sometimes start first from the *earth.* Kaemtz saw the spark leave two clouds and unite in the middle. I am inclined to explain these results as subjective phenomena. If, for any reason, one part of the flash is brighter than the other, it will require less time to make its impression upon the eye. Now, I have recently seen flashes which appeared the brightest at the lower end, because the upper was partially veiled by a cloud. And often the *two extremities* of an electrical spark are brighter than the middle.

But the direction in which bodies have been scattered by lightning has been principally relied on to show the probable direction of the lightning. And because pavements have been torn up, hair and hoofs carried into trees, a hat transported to the roof, the bark of trees detached below, leaves crisped on the under side, which was convex, and sods turned up on all sides, it has been concluded that the flash sometimes ascends. But the double burr which is seen on a card through which a Leyden jar has been discharged, and the marks of explosive power which generally characterize the mechanical execution of lightning, should be our caution not to give too much weight to such facts as have been briefly alluded to. It will not be thought necessary now, however, to say, with Maffei, who, a century ago, advocated ascending thunderbolts, that he could reconcile his views with Scripture, which speaks of the "fire falling from heaven." If it is simply required to know whether the cloud or the earth represents the positive end of the discharging line, we have only to place a steel needle at right angles to its course, and observe the disposition of the poles after the flash. Beccaria attempted to do this, by placing the steel parallel to the course of the lightning, and applying the experiments of Franklin, Dalibard, and his own.

Arago has divided the spark of atmospherical electricity into three kinds. 1. The zigzag. 2. Sheet-lightning. 3. Ball-lightning. The zigzag path is commonly manifested, if at all, between the earth and a cloud, and not between cloud and cloud. Sometimes a barbed form, as in the point of an arrow, has been attributed to it. When it divides, as is occasionally the case, into two branches, it is called *forked.* Less frequently three prongs have been seen. The division of the charge is often inferred from the simultaneous destruction of different objects, even when it has escaped detection by any visible branches in the illuminated track of the darting electricity. If the branches of the zigzag course of the lightning are very small, it produces an effect known under the name of chain-lightning.

Logan believed that the zigzag shape of forked lightning was an illusion, to be referred to the irregular refractions produced by clouds and vapors. But Arago justly remarks upon this that astronomers, when they observe celestial objects through the same clouds and vapors, do not witness such extraordinary influences upon light. In

this zigzag movement, the angles are very acute, so that if lightning were regarded as a projectile, the law of continuity would seem to be strangely violated. But if we consider lightning as moving by an undulation of some description, as light and heat are propagated, then these irregularities and this multiplicity of direction may perhaps derive some explanation from the action of crystals on light. But may it not be that the path of the lightning takes its direction from the accidental lines in which the conducting particles of vapor are arranged, as in the well-known experiment of the *spotted tubes?* Howard has seen lightning in its course double back upon itself, in a curve not unlike that of the planets in their changes from direct to retrograde motion, and back again. The zigzag flashes, which the Italians call "saette," carry generally destruction with them.

The second kind of lightning in the classification with which I started is sheet-lightning. "In the calmest nights," says Seneca, "with the stars shining bright, you may see lightnings flash; but doubt not in the direction of the lightning there will be found clouds which the spherical form of the earth hides from our view. The flash ascends on high, and appears in the bright and serene sky, being withal elaborated in some obscure and dark cloud."

Bergmann says that in Sweden these flashes are called "lightnings of the barley." This silent lightning is rarely seen when the sky is cloudy. It is much fainter than streak-lightning, as we see when the two kinds are visible at the same time. Lozeran de Fesc, in his dissertation on thunder, to which the Academy of Bordeaux awarded its prize in 1726, supposed these summer, heat or silent lightnings, to be reflected.

This silent lightning has frequently been supposed to be the reflection of distant storms below the horizon of the observer. It has been objected to this view, that a reflected light, inferior to common lightning in the same proportion that twilight bears to day-light, would be too feeble to affect the eye. But Arago summons to the aid of the first supposition the fact, that in 1739, while Cassini and Lacaille were making experiments on the velocity of sound, a discharge of cannon near the light-house of Cette was seen where both the town and light-house were concealed by Mount St. Bauzeli. Again, in 1803, Baron Zach was flashing gunpowder on the Brocken, as a signal for longitudes. The flashes were seen on Mount Kenlenberg, one hundred and eighty miles off, although the mountain itself was below the horizon. Moreover, when guns are fired at the Hotel des Invalides, in Paris, the light is seen in the gardens of Luxembourg, where no part of the first building is in view. In many cases, it is known that a storm has been raging below the horizon, betraying itself to the observer by no clouds or noise, but only by the reflected light. On the 10th of July, 1783, the town of Geneva was visited by a terrible thunder-storm. From the Hospice du Grimsel, Saussure saw the light, without any clouds or noise, in that direction. It is not so easy to dispose of those instances in which heat-lightning has played for a whole night on all sides of the horizon. Can we suppose a storm all around, while over our heads is an oasis of serenity? Moreover, Deluc men-

tions instances in which one flash from a visible cloud was attended by a stunning noise, and the next, though equally bright, was inaudible. May it not be that in some cases the thunder is inaudible, because the electric discharge occurs between cloud and cloud in regions of highly rarified air? Arago proposed to test the reflection of the light by his polariscope.

Arago says, in regard to ball-lightning, that many questions might be asked of it, in presence of which science would stand mute. From the works of Boyle he has gleaned an accident which occurred to the ship Albemarle, near Cape Cod, in 1681. A flash of lightning was seen, and something fell upon deck which the men could not extinguish nor sweep overboard. Deslandes relates that a church was struck near Brest, and three balls of fire were seen, each three and a half feet in diameter. In 1772, such a ball was seen to oscillate in the air, and then fall. On the 7th of December, 1838, the Royal ship Rodney was struck, with a sound equal to that of a thirty-two pounder. Two men were killed, and their clothes burnt off. Their comrades said they saw balls of fire, and ran after them to throw them overboard. In 1848, such a ball came slowly up, and exploded upon the mainmast of a United States ship in the Gulf Stream. Joseph Wasse, in Northamptonshire, thought that, in 1725, he heard the noise of the motion of one ball through the air. These balls are visible from one to ten seconds. They are said sometimes to strike the earth and rebound. Are they subjective phenomena, originating in a dazzling brilliancy of the lightning, or are they agglomerations of ponderable substances? Fusinieri states that he has often found iron in various degrees of oxidation and sulphur in the powdery deposites around the fissures through which the lightning has entered. As pertinent to the statement that thunder-stones, so called, are found in the trunks of trees, Arago asks the question whether thunder has introduced toads into the trunks of trees.

To ascertain the duration of lightning in its various phases, Arago proposes to use a wheel of a definite number of spokes, which shall be turned by clock-work. The duration will be given either by the velocity necessary to make the whole circular area appear illuminated, or by the arc illuminated with a fixed velocity. Arago credits this contrivance to Wheatstone. I will remark, in regard to the color of lightning, in general, that when the discharging clouds are near the earth the light is white, and when they are at a great height the light is reddish or violet.

I may premise what I have to say on the subject of thunder by observing that sound, in general, is a vibration, sometimes originating in an aerial disturbance, and at least generally *transmitted* by the air, whatever its origin. Some physical writers have been anxious to determine the way in which the original disturbance is created. Is thunder produced *in* the cloud? or is it produced by the passage of the electricity from cloud to cloud or from a cloud to the earth? There are those who lay stress upon the exceeding velocity of electricity, and imagine that as it rushes along in the air, it leaves behind itself a vacuum, into which the air dashes with a great noise, as in the bladder-glass experiment with the air-pump. Others attribute the noise of thunder to the sudden com-

pressions and dilatations which the air undergoes. Pouillet thinks the passage of a cannon-ball through the air with the same speed would make as great a sound as that of thunder. He also suggests, whether the conduction of electricity by such a substance as the earth's atmosphere may not consist in a rapid induction from particle to particle; and whether the alternate decompositions and recompositions involved in these successive molecular inductions may not be the violence which produces the sound. If, in a single instance, the elevation of a thunder-cloud were computed by the interval between the flash and the report, and on the assumption that the sound originated in the cloud, and this calculated height compared with the true height as known in other ways—as, for instance, by the position of the cloud in respect to a steeple or other object whose height was known—it would be possible to determine at least *where*, if not *how*, the sound was made.

Aristotle says of the sound, "For thus in clouds, a separation of the pnuematic substances taking place, and falling against the density of the clouds, produces thunder." Pliny suggests, whether thunder may not be caused by shooting stars, hissing as hot iron does when put in water. But he wisely adds, "These things are hidden with the majesty of nature, and reserved within her cabinet." Lucretius compares thunder to the sound which accompanies the tearing of paper, silk, or parchment. He thought violent winds squeezed it out of the clouds. Descartes thought that an upper and lower stratum rushed together, as he had sometimes seen happen in the Alps. And we might say with Seneca, "If clapping the hands makes such a noise, what must we hear when two clouds come together with a rush?" Peytier and Hossard observed that the thunder from clouds in which they were immersed sounded like the blaze of powder when set on fire in an open space. Richard, in his Histoire de l'Air, compares it to the sound made by the rolling of a heap of nuts upon wooden planks. But as soon as he rose above the clouds, the thunder was loud again.

Aristophanes ridicules the meteorological speculations of the ancients in the following passage from the "Clouds":

"*Strepsiades*. But tell me, who is it that thunders? That makes me terribly afraid.

"*Socrates*. The clouds, as they roll along, give birth to the thunder.

"*Strep*. How? O, most audacious man!

"*Soc*. When they are saturated with much moisture, and are compelled to be borne along, and, full of showers, lower themselves from necessity; if in this heavy state they dash against each other, they explode and crack.

"*Strep*. But is it not Jupiter that compels them to be borne along?

"*Soc*. By no means; but the etherial vortex.

"*Strep*. Vortex? It certainly had escaped my notice that Jupiter had ceased to be, and that Vortex now reigned in his stead. But you have as yet told me nothing concerning the noise of the thunder.

"*Soc*. Have you not heard me say that the clouds, when full of moisture, dash against each other, and resound by reason of their density?

"*Strep.* How am I to believe this?

"*Soc.* I will prove it to you from your own case. Have you not, after you have been stuffed with broth at the Panathenaic festival, then felt a disturbance in your belly, and a rumbling has suddenly resounded through it?

"*Strep.* Yes, by Apollo, I have; and it has played the mischief with my inside.

"*Soc.* And is it not probable that the air, being boundless, should make a much more mighty thundering?"

Every one distinguishes between a clap of thunder and the pealing sound which frequently is heard. This prolonged noise sometimes lasts from thirty-six to forty-five seconds. Captain Scoresby, near Lake Killarney, observed that the sound of a pistol-shot continued thirty seconds. In the neighborhood of Paris, where the echo is not remarkable, the report of a cannon was audible from twenty to twenty-five seconds. Many think the rolling sound of thunder sufficiently explained when they refer it to a complicated system of echoes. It is not a fatal objection to this view that the thunder rolls also at sea, because the clouds can reflect as well as the solid mountains of the earth. The report of a cannon or pistol is repeated in a lowering sky, when it is not in clear weather. The French academicians, while making their experiments upon sound, observed that, whenever clouds were between their two stations, the signals were reverberated so as to sound like thunder. Peclet, however, argues that the rolling of thunder cannot proceed from the reflection of sound from the clouds, because at sea the report of a cannon is *never* repeated in that way.

Dr. Hooke, in 1706, started the explanation given in Herschel's Treatise on Sound. He rests his theory on the moderate velocity with which sound travels through the air. This distinction between the velocity of luminous and acoustic radiations of bodies is thus described by Pliny, though referred to the wrong cause: "That the lightning is seen before the thunder-clap is heard, although they come indeed jointly together, it is certainly known. And no marvel, for the eye is quicker to see light than the ear to hear a sound. And yet Nature doth so order the number and measure, that the stroke and the sound should accord together; * * * neither is any man stricken who either saw the lightning before or heard the thunder-clap." Lucretius knew better why the sound comes after the flash. But the question has been raised, whether the lightning strikes before it is visible. Arago brings forward many cases of persons who were struck, and yet heard and saw nothing.

If we suppose an electric disturbance to take place, not at a single focus, but along a great length of cloud or moist air, the audible effects of this disturbance will reach the ear from the different points of its origin in successive instants; so that a sound which, at its departure, is contemporaneous in time, but diffused in space, produces an impression upon the organ of sensation, local in *space*, but prolonged in *time*. Dr. Robinson illustrates this view by a very long file of soldiers, and by the multiplied sound which would be heard by one placed in the same line beyond, if their guns were all fired together. Lardner has objected to

this analogy, that in the latter case, we should not have a succession of sounds, but a note of a certain pitch.

If Hooke's account of rolling thunder is adopted, it will be necessary to suppose the train over which the electric discharge runs to be three or four leagues long in some remarkable storms. As all the peculiarities of sound, and the combination of sudden claps and rolling peals, depend on the configuration of the clouds with respect to the point addressed by the noise, we may say with Kaemtz, that every observer hears his own thunder as he sees his own rainbow.

It has already been stated, that *silent lightning* is not unfrequent. It is no less true that there is *invisible thunder;* that is, thunder without lightning or even clouds. Seneca says that it thunders sometimes without lightning. In 1751, this was frequently observed at Martinique. We must exclude from the account earthquake countries. In St. Fé de Bogotá, the thunder mass is pronounced every year. The obvious explanation of invisible thunder is, that it proceeds from clouds below the horizon. In pursuing this view, we are arrested by the fact, that thunder is never heard at any very great distance, and that clouds in which the discharge of electricity is audible, but invisible, must therefore be excessively near the earth's surface. De l'Lisle once counted thirty-two seconds between the flash and the report. Arago finds no instance recorded greater than forty-nine seconds. If this method of calculation is accurate, it would appear that thunder has never been heard to a greater distance than fifteen miles. The remarkable limitation of this maximum distance is proved by other means, perhaps less exceptionable. On the 25th of January, 1757, a steeple in Cornwall was struck. The great engineer Smeaton, who was only thirty miles distant, saw the light, but heard no noise. Muschenbroek says it thunders at the Hague when no sound is heard at Leyden or Rotterdam, which are only ten and thirteen miles off. Also, thunder at Amsterdam is not heard at Leyden, which is removed from it twenty-two miles and a half. It certainly is strange that the sound of thunder, which, in many cases, has been compared to one or two hundred pieces of artillery booming at once, should be inaudible at distances exceeding fifteen or twenty miles, especially when we consider that cannonading has been heard two hundred miles. The Emperor Kanghi was surprised that thunder could be heard only ten leagues, when he had heard artillery thirty leagues. The distinguished meteorologist, Howard, relates that, in 1812, when a continuous stratum of mist prevailed, he could hear the carriages on the stones of London streets when he was five miles away. The great bell of St. Paul's cathedral is heard at Windsor, over a distance of twenty-four miles.

Now, in a level country, an object can be seen at the distance of fifteen miles, if it is vertically raised as much as one hundred feet [?] above the earth's surface. Hence we are driven to the conclusion, either that invisible thunder comes from clouds which are less than one hundred feet in elevation, or else that the electric discharge can take place in an apparently serene sky, and that it may be accompanied with a heavy report without a corresponding flash. Can there be an electric discharge from a clear and serene sky? In reply to this question, Arago has marshalled many cases related by Pliny, Suetonius, and Crescentius,

in which lightning was described as flashing from a clear heaven; but nothing is said about the thunder. Anaximander believed that it might thunder from a serene sky, for he attempted to find out the cause. There is not so much difficulty when thunder, unaccompanied by lightning, is heard *in the presence of clouds*, for then possibly the discharge may be in higher regions of clouds, the view of which is screened from the hearer by intervening strata too dense to be penetrated by the lightning's flash. But many would prefer the alternative of supposing that thunder-clouds are sometimes less than one hundred feet above the earth's surface, to admitting that it can thunder with or without lightning from a serene blue sky; especially if, soon afterwards, clouds appear. Volney relates, that, at Pontchartrain, he heard peals of thunder, but saw no clouds, even in the horizon. But in the course of an hour, majestic hail-clouds rose into sight.

The destruction actually caused by thunder and lightning is wholly disproportioned to the apprehensions which are felt concerning them. But fear of evil is itself a real evil; and whatever inspires confidence, is the occasion of as much happiness as if really protected and saved.

According to the calculation of chances, and in a general view of the subject, the danger that any particular individual, building, or ship, will be struck by lightning within a specified time, is certainly very small; but small as this liability is, it has sometimes been said that a man had three chances of being killed by lightning to every single chance which he could expect of drawing a prize in a lottery; so that, whoever purchases a ticket, may feel assured that he is likely to be killed three times by a thunderbolt while he is drawing one prize!

Some spots of the earth's surface, from geographical and geological peculiarities, as well as meteorological exposure, are in much less danger of being struck than elsewhere. In Lima, there is little thunder, and the sky is almost always clear. Those natives who have not travelled, do not know what thunder and lightning are. Four cases only of thunder are on record since 1652, and these were considered so extraordinary that the epochs are preserved. In Island L., there is supposed to be no thunder; and in fact, during two years, from 1833 to 1835, thunder was heard there only once. Erman states, that at Meta there are no thunder-storms in winter, and rarely in summer, while at Udskiz they are frequent and violent; he also alludes to the thunder in winter at Yerbinsk. Scoresby says there is no lightning seen at Spitzbergen. Gisecke heard thunder but once in Greenland during a residence of six years. Many navigators (among whom may be mentioned Phipps, Scoresby, Parry, and Ross) are of opinion that less thunder is heard as you approach the poles. In 1827, Parry did not hear it once. It never thunders above the parallel of 75°, and rarely between those of 70° and 75°. Scoresby says that lightning is seldom witnessed north of the arctic circle, and its occasional flashes are not accompanied with thunder. Hence, as you approach the tropics, the thunder-storms become more frequent. Ross and Scoresby observed that the electrometer was rarely affected in the arctic regions; and, in 1819, Parry noticed that the electrometer-chain on the mast did not affect the pith-balls of the instrument. In England, France, and Germany, it thunders twenty days in a year; in Rio Janeiro and l'Inde, it

thunders fifty days annually. Pliny relates that it never thunders in Egypt. Plutarch makes the same statement in regard to Ethiopia. But at the present day, thunder is not uncommon in Cairo and Alexandria; and as thunder occurs in the countries adjacent to Ethiopia, it may be supposed that it occurs there also. The scanty data which exist, indicate that thunder is more common on land than on water. Arago thinks, that at a certain distance from land it never thunders; but he allows that more facts are wanting.

Thunder-storms are more frequent in summer than in winter; though, according to Schubler, the electrical charge of the air is less intense at that season in clear, and even in cloudy weather. Pliny remarks, that lightning is more common in autumn and spring than in summer or winter. But Arago infers that thunder-storms, if less frequent, are more dangerous in winter than in summer, from the following facts, compiled from Harris's papers: Out of all the ships struck by lightning between the Mediterranean and the coast of England, from 1681 to 1832, twenty-three cases belong to the first four months of the year; sixteen occurred in the last four months of the year, and only four in the other months.

It has been conjectured that, in countries where there are mines, there are fewer thunder-storms. But, on the contrary, no one willingly inhabits El Sitio de Tumba barreto on account of the frequency of the lightning-strokes. This place is near gold mines, and many miners are killed there. Boussingault found that a thunder-storm was felt there almost every day. In the month of May, he counted twenty days so distinguished. His own guide was struck to the ground. The Loma de Pitago, near Popayan, enjoys the same melancholy celebrity. A Swedish botanist, persisting, contrary to advice, in crossing it during a storm, met his death in the attempt. It has been conceded to the Popayanos "to have the best thunder in the republic." In Europe, the "Infames Scopulos," as Horace calls them, of the Acroceraunian mountains, which Cassius Dio calls the Citadels of Thunder, have a terrible reputation.

Pliny mentions a tower so often struck, that its renewal was finally abandoned. A school-house in Lammer Muier was struck on three different occasions. In 1826, the same house, in Wethersfield, Connecticut, was struck twice in an interval of only two or three days. Hutchinson says that, at Jamaica, the clouds at noon cover the mountains at Port Royal; it then thunders so loudly that the sound is heard at Kingston. At half-past two in the afternoon the sky is clear again. These changes of weather occur every day for five months, from November to April. In Boston, the same steeple has been struck repeatedly. In 1763, the steeple of Antrasme was struck twice during the same storm. On the 25th of April, 1760, the lightning fell three times in twenty minutes on the buildings of Notre Dame de Ham. On the night of the 14th of April, 1718, twenty-four steeples were struck along the coast of Brittany; and on the 11th of January, 1815, twelve steeples suffered a similar fate in the Rhenish provinces. In 1783, a German antiquarian in this province of meteorology found that, within the period of thirty three years, three hundred and eighty-six steeples had been struck, and one hundred and twenty-one ringers killed.

There is a great difference of exposure observable in various Departments of France. And the fatality of single years is not the same even at the same place. In 1805, only one individual is known to have been killed in France by lightning. In 1797, twenty-four were struck and seventeen killed. In 1819, twenty-two were killed. In other places, nine individuals have been killed at once and eighty-two wounded. On the 18th of February, 1770, all the inhabitants of Keverne, in Cornwall, who were in church, were thrown to the ground. In 1797, between June and August, eighty-four accidents and seventeen deaths occurred in the United States from thunder and lightning, as Volney found from the newspapers of this country. I have preserved accounts of three persons killed in 1850 in this country, fourteen in 1851, (and five churches struck,) six in 1852, thirteen in 1853, and twenty-two in 1854, besides many injured. At Gottingen, in a century, only three persons have been killed by lightning; in Halle, only two. In 1838, 1839, and 1840, forty deaths by lightning occurred in England, and forty-six in Wales. In 1815, twenty-four persons were struck by lightning in the Low countries.

If the statements of the ancient historians and poets are to be credited, thunder-storms have degenerated, and accidents from lightning are less common and less disastrous now than formerly. In Virgil, Ovid, and Propertius, more remarkable men are said to have met their fate in this way than can be counted up during the last two thousand years, notwithstanding the casualties which have befallen the ancient records. Arago thinks that facts render some support to the theory of degeneracy, and at least that thunder does not now so frequently as formerly officiate as minister of war. Herodotus relates that the army of Xerxes was struck by lightning, near Troy, and many men were killed. Pausanias records the same accident of the Lacedemonian army near Argos.

In estimating the destruction by lightning, property as well as life must be taken into the account. In 1417, the steeple of St. Mark, in Venice, was struck by lightning and burned. It was rebuilt, and again reduced to ashes on the 12th of August, 1489. It was afterwards built of stone, and was struck again on the 23d of April, 1745. The repairs this time cost eight thousand ducats. On the 27th of July, 1759, lightning burnt all the wood-work of the cathedral of Strasburg. It was proposed to place conductors upon it, but there was some objection on account of the expense. On the 14th of August, 1833, it was struck three times within a quarter of an hour, and so much damaged that the repairs cost $6,000,000. There was still some hesitation in regard to lightning-rods, when it was struck once more on the 19th of July, 1834. Rods were placed upon it in 1835, at an expense of only $3,000. On the 10th of July, 1843, it was struck twice, but the rods saved it. On the 18th of August, 1769, the tower of St. Nazaire, at Brescia, was struck, and the subterranean powder-magazine, containing 2,076,000 pounds of powder, belonging to the republic of Venice, was exploded. One-sixth of the whole town was laid in ruins, and the rest was very much injured. Three thousand persons perished. The property destroyed amounted to two million of ducats. The magazines of Malaga and Tangier have been fired by lightning. On the 26th of June, 1807, the powder-magazine of Luxembourg, containing

28,000 pounds, was struck, and, besides thirty persons killed and two hundred wounded, the town was ruined. Stones were thrown a league. Sir. W. Snow Harris quotes from Fuller's Church History the following: "Scarcely a great abbey in England exists, which, once at least, was not burned down with lightning from heaven."

Arago had compiled, in 1838, a catalogue of seventy-two vessels which had been struck by lightning. Mr. Harris has published an account of 235 ships of the British navy struck by lightning between 1793 and 1839. During fifteen months of the years 1829–30, in the Mediterranean alone, five ships of the British navy were struck. In a pecuniary view alone, the loss is very great. The lower mast of a frigate costs $1,000, and of a ship of-the-line $2,000. When the Logan, of New York, was consumed by lightning, the loss exceeded $100,000. The sacrifice of property was equally great when a similar fate befel the Hannibal, of Boston, in 1824. Sir W. Snow Harris says: "It appears from the records of the navy that the destructive effects of lightning on his Majesty's ships involved in former years an expenditure of not less than from £6,000 to £10,000 annually; in 200 cases only, 300 seamen were either killed or hurt, and above one hundred large masts, valued at the time at from £1,000 to £1,200 each, entirely ruined. Between the years 1810 and 1815, no less than ninety-five sail of the line and thirty-five frigates and smaller vessels were completely disabled." In the autumn of 1846, the ship Thomas P. Cope, bound from Philadelphia to Liverpool, was struck by lightning and fired. It was forsaken, and left to its fate. It had no conductors. The same calamity happened, in 1853, to the Golden Light, of Boston.

I may also add to Arago's catalogue, besides many of which I have kept no account, the schooner Forest, of Boston, which was struck, and one seaman killed; the schooner E. S. Powell, of Washington, which lost one seaman; the ship Audubon, at New York; the barque Emily Miner, in Mobile Bay, which was scuttled and sunk; the schooner Eglantine; the Young Tell, in the Penobscot; and the ship Shirley, of Boston; and, in 1853, three ships at New Orleans, viz: the Josiah Bradlee, of Boston, Raritan, of Kingston, and the Desdemona; also the Gem of the Seas, saved from much damage by the burning sacrifice of her conductor. In 1854, pilot-boat New York, the schooner Emma Hotchkiss, of New Haven, and ship Southport, at Savannah, were struck. Besides these, Mr. Harris mentions ten vessels destroyed by lightning since 1838, and thirteen injured, none of which are in my catalogue. When the barque Matagorda was struck, the captain and his wife were killed.

Still, after we have made as complete an inventory as possible of the loss of life and property on land and sea through the agency of lightning, we must admit that danger from the thunderbolt is one of the smallest liabilities to which a man is exposed in this world. Arago thinks the danger no greater than that of being killed by the falling of a flower-pot or chimney-top. Why, then, he asks, this exaggerated apprehension? Let Arago give the answer. If a loud detonation informed a whole city whenever a flower-pot or chimney-top fell, everybody would fear for his own head when he heard the noise. Besides,

the noise itself affects the nerves, as well as signifies the danger. Moreover, if the lightning strikes anywhere but rarely, its inoffensive flashes are innumerable. Augustus, it is said, was so timid in this respect that he sought refuge from lightning in a cave. So much for the courage of a great Roman Emperor. The ancients believed that lightning did not penetrate into the solid earth more than five feet. But the vitreous tubes hereafter to be mentioned prove that it penetrates sometimes to the depth of one hundred feet.

PROTECTION OF BUILDINGS FROM LIGHTNING.

"If there be one time more than another," says a late writer on electricity, "in which man feels that he is entirely in the hands of One mightier than himself, in which all his personal pride sinks in the conviction of his utter helplessness, it is when the forked bolts of heaven glare about him with frightful brightness, and the dread artillery of the skies stuns him with its deafening peals, and shakes the very earth on which he treads. Then, I say, it is that his conscience tells him how entirely dependent he is; and how, in a moment, the next flash might be to him the instrument of death, without his having the slightest power to arrest his fate. In respect to the other great and irresistible powers of nature, man, in some sort, seeks them out—the lightning's flash seeks out him. It is true, he may go to shores where thunder-storms are less violent, or to others where they are much more violent than in his own land; but, regarding it generally, lightning is no respector of time nor place; it was as much known to the ancients as to ourselves; it comes to us, so to speak, 'in season and out of season'—its geographical distribution is less restricted than that of any other of Nature's great phenomena—tempests, perhaps, excepted."

With this startling admonition before him, let any one of the readers of these observations pause for a moment and count the number of lightning-rods in his own neighborhood. Does he hesitate? He thinks there may be one on the village spire, and perhaps another on yon tall chimney; but where else, he knows not. Now, he is led to ask, What is the cause of this apparent neglect? Why this consummate audacity in trifling with the eternal laws of nature by erecting monuments and inviting down the fire of heaven, and providing no means of conducting it safely away? The leading reasons for this are, first, the comparatively few accidents by lightning; second, the very recent adoption of lightning protocols; third, the want of confidence in the efficacy of the latter; and, fourth, their cost.

Although the extreme magnitude of accidents by lightning cannot be otherwise than recognised by all, and the almost certainty of some one or more buildings being the marked victims at every season, yet each man builds with the chance of his edifice not being the fatal one. Amongst so many, the chances are so much in his favor that he will run the risk; or else he comes to the still more unphilosophical conclusion that, as storm after storm has left him unscathed, so will he forever be safe.

With regard to the comparatively recent discovery of means of averting the effects of lightning, it will be remembered that it was not

until the month of June, 1752, that mankind knew what lightning really was. Then it was that Dr. Franklin first drew down lightning from the clouds by means of a kite, and proved its entire identity with electricity, which discovery led him to the construction of lightning conductors. But before treating of these, perhaps it may be interesting to give some of the precautions adopted by the ancients, in order to protect themselves against this "eternal fire." According to Herodotus, the Thracians, in times of lightning, were in the habit of shooting arrows against the sky, to repel it from the earth. Augustus used to retire into a cave during thunder-storms, on the strength of an opinion then prevalent, that lightning never penetrated into the ground more than five feet deep. The emperors of Japan, it is said, possessed a refinement on this mode, by building reservoirs above the caves, into which they retired, and kept them constantly filled with water, in order, as they thought, to put out the fire of the lightning. Augustus, who appears to have been terribly alarmed at this element, used, also, to wear a seal-skin cloak during storms, on account of its assumed protecting efficacy. The Romans used to build seal-skin tents, into which the timid retired; and the shepherds of Cevennes, even at the present day, wear hat-bands of serpent-skins for the same purpose. Tiberius wore a chaplet of laurel, whenever he dreaded danger from a storm, with a belief that lightning never touched that foliage. And it is a well-known fact, that American Indians, whenever the sky wears the appearance of a thunder-storm, quit their pursuits and take refuge under the nearest beech, with the full assurance that the electric bolts never scathe that tree.

If the ancients were thus industrious to use what, in their ignorance, they thought to be the means of safety against an agent, the nature of which they knew little or nothing, and the action of which they knew still less, how much more does it seem to be the duty of the present generation, who both understand it, and the means of averting its effects, to avail themselves of the advantages of their knowledge, and employ the remedies they have at their command? Not a year passes without numerous cases of buildings being struck by lightning for want of proper protection, particularly barns, which, in consequence of the humid gases ascending from the newly-gathered crops, are peculiarly liable to this injury. The necessity and the value of lightning-rods are obvious, and need no further comment.

As scientific knowledge has now obtained its proper rank in our schools, but few can be ignorant of the fact that all matter is divided into two general classes—*conductors* and *non-conductors* of electricity. These names, however, are only comparative, for the two classes gradually emerge into each other, leaving the distinctive term merely an expression of degree. For instance, copper ranks very high in the scale of conductors, and air occupies a very low rank among insulaters; yet an electric shock will sooner pass through a short interval of air than over a long copper wire. This fact is dependent on a law, the due observance of which can alone insure the efficacy of any protecting apparatus. Another modification in a conducting body, of a comparatively high rank, is its *capacity*, which exercises an important influence over its conducting power. Thus, an electric charge which will pass safely

and quietly along an ordinary copper wire, will deflagrate and burn up entirely an extremely fine wire of the same kind of metal.

The most important things to be considered in the choice of lightning rods, are, that they should consist of good conducting materials; good capacity; and should have a good connexion with moisture in the earth. In addition to these, the area of their protecting influence should be regarded; the number of rods required for each building; their position in special cases; and the modes of arranging them.

With regard to the *conducting materials* employed in their construction, metal is undoubtedly the best, and the choice would seem to lie between copper and iron. M. Pouillet makes the conducting power of copper from 5½ to 6½ times that of iron; Dr. Priestly makes it 5 times as much; and Professor Faraday 6⅗ times as much; so that, after having determined the sectional area of an efficient copper rod, an iron one of about six times that area will possess the same conducting power. Iron, however, will not make durable and efficient conductors, unless they are entirely coated with silver, copper, tin, palladium, (which possesses 9 times the conducting power of iron,) or gold, in consequence of their liability to rust, or oxidate, by the action of the weather.

As to the *capacity* to be given to a rod, it has been decided by common consent, that the *sectional area* of one composed of copper should vary from a circle one-half of an inch to three-fourths of an inch in diameter, the larger area being for very tall conductors, and the smaller for shorter ones. And now, in respect to the *form of the rods*, it is quite immaterial whether they be square, round, or flat; but let it be remembered that, in all cases, each conductor should be as entire and as straight as possible, presenting a *single point* to the clouds, with the apex tipped with palladium, the most powerful of all conductors of electricity known. A bundle or rope of copper wire has been found to be a very efficient protection against lightning, as has been fully tested on St. Peter's church at Rome, all other methods having previously failed.

Of all considerations, the most important is a good *connexion* with the earth, which is so very essential, that without this, all other precautions will be in vain. It is not enough that the conductor enter the earth; for it must penetrate it to some depth, in fact till it reaches the subsoil, where it is well impregnated with water. In order to reduce the destructive action of this moisture, (the oxydation of the metal,) and at the same time to give the buried portion of the conductor every facility for dissipating its charge, it is better that the rod should terminate by several branches in a sunken bed of well-burnt charcoal, wood-ashes, or spent tan-bark.

Another important point to be considered, is the *situation and position* in which the rods are to be placed after they are put up. In all cases, they should be elevated above every other point of attraction, at least *four times the diameter of the area* to be protected; say, in a common-sized house, from 10 to 15 feet above the top of the highest chimney, or other object extending above the roof. And, as before intimated, the integrity and upright position of the rods should be maintained, as far as practicable, avoiding, also, all abrupt angles and short turns. If a

house, barn, church, factory, &c., be located in the immediate neighborhood of each other, and only one of them be protected, the danger of all the others will thereby be increased. The remedy, in such case, is so obvious, that nothing is necessary to be added on that score.

The question now presents itself, How are the rods to be affixed to the building, by *conducting* or by *insulating staples?* The unequivocal reply would be, by conducting staples—not those covered with copal varnish, nor insulated by necks of glass bottles, as has often been recommended by writers on this subject; for, let it be remembered that the flash, which may have forced its way through many yards of air, would find no difficulty in passing so slight obstacles as these, if such a direction formed a part of the lightning's path previously prepared, or "felt out." It is a well established truth, that if a conductor pass near a mass of metal in tolerable connexion with the earth, the flash will sometimes divide itself between the two channels, one portion of it continuing its course down the rod, and the other portion leaving it to pursue the side path. Therefore, in order to alleviate this "lateral discharge," or deviation from the main channel, all suspected vicinal electrified bodies should be united to the conductor itself, by means of metallic wires or bands. Then, if the building is predisposed, by the antecedent inductive action, to share with the rod in conveying away the fluid, let it be done in good sooth, without an explosion—without a *fracas*, as the French emphatically call it.

Conductors should neither be painted nor varnished, as that would diminish their conducting power. If made of iron, they should be coated with metal, as before suggested, and may be erected at either on both sides or ends of a building, at a distance of about four inches from the walls, supported by iron staples or wooden supports.

D. J. B.

COMMERCIAL STATISTICS.

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from the district of Milwaukie, Wisconsin, during the year ending December 31, 1854: *by* John White, *Collector.*

Articles.		Amount conveyed coastward.	Valuation.
Ashes, pearl	tons	187	$6,800 00
Ashes, pot	do	68	
Bacon, assorted	casks	635	7,620 00
Bacon hams	tierces	3,690	110,700 00
Barley	bushels	323,267	226,286 90
Beans	do	5,901	5,901 00
Beef	barrels	7,524	90,288 00
Beer	do	8,500	64,000 00
Bricks	number	3,645,000	25,515 00
Brooms	do	30,219	300 00
Butter	pounds	305,500	45,825 00
Candles	do	43,840	6,576 00
Cattle	number	700	31,500 00
Cheese	pounds	40,350	3,628 00
Corn, shelled	bushels	289,825	164,353 75
Cranberries	do	1,491	4,473 00
Eggs	number	687,600	5,730 00
Flour	barrels	555,051	1,085,357 00
Ginseng	pounds	8,035	3,214 00
Grass-seed	bushels	17,530	70,012 00
Hay	tons	6,000	48,000 00
Lard	barrels	3,960	72,000 00
Lime	do	12,823	11,284 00
Oats	bushels	424,487	162,815 00
Onions	do	1,092	546 00
Pork	barrels	24,558	294,696 00
Potatoes, common	bushels	58,477	35,086 00
Rags	pounds	48,886	1,466 00
Rye	bushels	131,179	104,943 00
Snuff	pounds	20,525	4,642 00
Tobacco, leaf	do	64,928	12,985 00
Vinegar	gallons	21,632	1,130 00
Wheat	bushels	2 052,319	2,565,398 00
Whiskey	gallons	41,800	11,704 00
Wool	pounds	226,458	72,466 00
Total			5,357,240 65

Statement of the quantity and estimated value of property transported to Tide Water, at Albany, on the Erie and Champlain canals, in the State of New York, during the years 1853 *and* 1854.

PRODUCTS OF AGRICULTURE.

Articles.	1853.		1854.	
	Quantity.	Average value.	Quantity.	Average value.
PRODUCTS OF ANIMALS.				
Bacon.....pounds.	19,953,400	$1,795,806	18,326,306	$1,648,298
Beef.....barrels.	95,531	758,516	53,068	524,681
Butter.....pounds.	5,170,000	827,200	2,554,193	563,016
Cheese.....do...	10,090,200	882,892	5,675,169	613,405
Hides.....do...	940,500	117,562	201,975	31,234
Lard, tallow, and lard oil.....do...	11,550,100	1,212,760	16,803,210	1,718,738
Pork.....barrels.	105,000	1,496,250	141,846	1,729,921
Wool.....pounds.	5,998,700	2,759,402	3,129,387	1,091,335
Total tons.....	59,187	9,850,388	53,968	7,920,628
VEGETABLE FOOD.				
Barley.....bushels.	2,497,860	$2,010,380	1,949,279	$2,188,158
Bran and ship-stuffs.....pounds.	38,306,260	306,450	17,014,526	191,222
Corn.....bushels.	3,198,002	2,287,031	12,876,434	10,648,306
Corn meal.....barrels.	2,336	6,447	173,417	774,292
Dried fruit.....pounds.	655,680	52,454	603,421	50,359
Flour.....barrels.	3,063,742	17,677,791	1,249,458	11,434,807
Oats.....bushels.	4,034,206	1,815,392	5,358,121	2,676,567
Peas and beans.....do...	74,654	67,188	170,745	250,621
Potatoes.....do...	489,918	274,354	626,489	407,182
Rye.....do...	155,788	137,872	225,362	278,770
Wheat.....do...	9,432,657	12,356,780	3,523,794	7,047,570
Total tons.....	869,110	36,992,139	790,168	35,947,854
OTHER AGRICULTURAL PRODUCTS.				
Clover and grass-seed.....pounds.	1,217,200	$85,204	943,013	$84,235
Cotton.....do...	469,400	53,981	733,812	71,949
Flax-seed.....do...	532,500	10,650	131,851	4,587
Hemp.....do...	968,500	62,628	2,267,924	156,756
Hops.....do...	16,700	6,012	914,013	322,699
Unmanufactured tobacco.....do...	4,685,900	1,077,765	6,634,056	1,191,496
Total tons.....	3,942	1,296,240	5,813	1,831,722
Total agriculture, in tons.....	932,239	48,138,767	849,949	45,700,204

STATEMENT—Continued.

PRODUCTS OF THE FOREST.

Articles.	1853.		1854.	
	Quantity.	Average value.	Quantity.	Average value.
Ashes, pot and pearl..........barrels	31,808	$869,630	26,026	$959,549
Boards and scantling......1,000 feet.	667,516,928	10,680,270	522,478,355	8,315,426
Fur and peltry..............pounds.	183,205	229,006	67,340	85,337
Shingles.........................M.	38,182	137,837	25,836,744	124,674
Staves ....pounds.	158,163,100	759,183	182,061,491	832,320
Timber.............100 cubic feet.	5,234,316	889,833	4,456,099	927,958
Wood.......................cords.	10,500	49,875	16,270	88,245
Total of the forest, tons......	1,340,261	13,615,634	1,182,921	11 333,509

OTHER ARTICLES.

Articles.	1853.		1854.	
	Quantity.	Average value.	Quantity.	Average value.
Copper ore..................pounds.	2,378,000	$368,590	3,575,120	$798,190
Gypsum.........................do...	8,269,500	17,365	15,199,939	30,400
Live cattle, hogs, and sheep ...do...	239,450	7,183	167,520	5,026
Mineral coal...................do...	30,274,066	75,685	111,171,940	461,510
Stone, lime, and clay..........do...	153,348,000	230,022	137,511,257	902,008
Sundries ....do...	141,285,020	2,825,700	201,934,314	4,038,686
Total tons..................	167,897	3,524,545	234,782	6,235,820

STATEMENT—Continued.

PRODUCTS OF MANUFACTURES.

Articles.	1853.		1854.	
	Quantity.	Average value.	Quantity.	Average value.
Bar and pig lead............pounds.	171,700	$9,444	850,778	$58,581
Bloom and bar iron...........do...	21,538,000	430,760	18,676,715	461,103
Castings and iron ware.........do...	2,745,800	96,103	1,786,878	60,024
Domestic spirits.............gallons.	3,805,723	356,288	2,088,721	773,865
Domestic wollens ....pounds.	150,700	135,630	305,572	271,166
Domestic cottons ....do...	1,047,700	272,402	1,310,575	373,155
Domestic salt...............do...	8,601,900	37,848	8,805,087	64,186
Foreign salt ....do...	....	....	1,248,490	30,936
Furniture..................do...	469,800	49,329	770,941	77,094
Leather...................do...	7,307,100	1,095,065	6,217,273	1,292,365
Oil-meal and cake............do...	16,925,400	211,567	13,622,755	385,879
Pig-iron ....do...	8,607,200	86,072	11,915,564	182,709
Total manufactures, tons.....	52,817	2,781,508	43,129	4,031,063

PRODUCTS OF MERCHANDISE.

Articles.	1853.		1854.	
	Quantity.	Average value.	Quantity.	Average value.
Flint, enamel, crockery and glass-ware...............pounds.	357,100	$35,710	332,385	$30,181
Iron and steel ....do...	1,247,500	31,812	9,342,043	412,043
Nails, spikes, and horse-shoes..do...	7,432,000	222,960	4,573,412	208,904
Other merchandise...........do...	16,102,300	4,830,690	13,574,161	4,625,026
Railroad iron...............do...	....	....	1,763,851	40,374
Total merchandise, tons......	12,633	5,121,172	15,774	5,316,528
Grand total, tons............	2,505,847	73,181,626	2,326,555	72,617,124

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from the port of Baltimore, Maryland, during the year ending December 31, 1854: *by* PHILIP F. THOMAS, *Collector of Customs.*

Articles.		Number.	Av'ge prices.	Valuation.
Apples	barrels	52	$2 00	$104 00
Apples, dried	do	438	6 00	2,628 00
Bacon	boxes	10,100	33 00	3,333 00
Bacon	hogsheads	184	45 00	8,280 00
Bacon	casks	807	45 00	36,315 00
Bacon hams	tierces	146	30 00	4,380 00
Bacon hams	hogsheads	35	80 00	2,800 00
Bacon, in bulk	pounds	2,440,352	9	219,631 68
Bark	do	1,614,695	....	14,483 00
Barley	bushels	91	1 20	109 20
Beans	do	1,183	1 32	1,561 56
Beef	barrels	2,728	15 00	40,920 00
Beef	tierces	2,018	42 00	84,756 00
Bees-wax	pounds	17,495	31	5,423 45
Biscuit and shipbread	barrels	15,362	....	70,487 00
Biscuit and shipbread	kegs	5,373		
Brooms	dozen	1,296	1 80	2,332 80
Buckwheat	bushels	47	1 00	47 00
Butter	pounds	125,931	15	18,889 65
Candles	do	492,556	16	78,808 96
Cattle	number	17	21 00	57 00
Cheese	pounds	58,818	13	7,646 34
Cider	gallons	414	67	277 38
Cordage and cables	pounds	69,216	12	8,305 92
Corn, shelled	bushels	527,683	85	448,530 55
Corn-meal	barrels	38,231	4 00	152,924 00
Cotton	pounds	565,121	10	56,512 10
Cotton, printed or colored		....	....	196,622 00
Cotton, uncolored		....	....	239,949 00
Flour	barrels	510,382	8 00	4,083,056 00
Hay	tons	22	21 00	462 00
Hogs	number	96	7 00	672 00
Hoops	M	21	33 00	693 00
Hops	pounds	6,183	31	1,916 73
Horses	number	16	100 00	1,600 00
Lard	pounds	1,054,175	11	115,959 25
Lumber, pine	1,000 feet	5,090	20 00	101,800 00
Lumber, oak	do	53	30 00	1,590 00
Masts and spars	number	....	....	159 00
Molasses	gallons	1,048	26	272 48
Mules	number	24	90 00	2,160 00
Oats	bushels	4,083	54	2,204 82
Oil, castor	gallons	24	1 10	26 40
Oil, linseed	do	1,415	90	1,273 50
Oil, lard	do	8,901	80	7,120 80
Onions	bushels	5,859	75	4,394 25
Peaches	do	300	1 00	300 00
Peas	do	10,504	1 27	13,340 08
Peanuts	do	73	1 25	9,125 00
Pork	barrels	7,811	13 00	101,543 00
Potatoes	bushels	2,442	1 12	2,735 04
Rice	tierces	2,061	27 00	55,647 00
Rye	bushels	1,132	1 14	1,290 48
Rye-meal	barrels	1,587	6 50	10,315 50
Sheep and lambs	number	167	4 00	668 00
Shooks	M	12	3 00	36 00

STATEMENT—Continued.

Articles.	Number.	Av'ge prices.	Valuation.
Snuff ....pounds	299	....	$61 00
Spirits from grain............gallons	14,335	$0 56	8,027 60
Spirits of turpentine............do......	25,611	65	16,647 15
Staves and heading ....M....	610	37 50	22,875 00
Sugar........................pounds	14,338	10	1,433 80
Swine............................do......	2,529	24	606 96
Tallow ....do......	417,068	11	45,877 48
Tobacco, leaf ....do......	40,524,207	7	2,836,694 49
Tobacco strips ....do......	16,100	4	644 00
Tobacco stems.....................do......	1,105,480	5	55,274 00
Tobacco, chewing ....do......	306,412	10	30,641 20
Vinegar ....gallons	3,683	11	405 13
Wheat ....bushels....	156,560	1 80	281,808 00
Total........................	....	....	9,527,470 73

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from Charleston, South Carolina, in the year ending December 31, 1854.

Articles.	Amount shipped to foreign ports.	Valuation.
Bacon ....pounds.	44,511	$4,013
Beef ....barrels.	7	....
Beeswax ....pounds.	1,127	310
Biscuit and ship-bread....................bbls. or kegs.	34	126
Butter ....pounds.	2,502	652
Candles ....do...	650	170
Cheese ....do...	307	40
Corn, shelled ....bushels.	3,144	3,469
Cotton ....pounds	104,746,951	10,920,400
Flour ....barrels	5,899	46,857
Lard ....pounds.	9,512	1,276
Pork ....barrels.	10	139
Potatoes ....bushels	240	358
Rice ....tierces .	44,097	1,058,365
Rice ....barrels.	16	
Staves and heading ....M	66	6,193
Tobacco, manufactured.....................pounds.	1,000	250
Vinegar ....gallons.	1,552	203
Total....................................	....	12,042 821

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Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from Chicago, Illinois, during the year ending December 31, 1854: *by* W. B. SNOWHOOK, *Collector.*

Articles.		Am'nt conveyed coastward.	Am'nt conveyed inland.	Am't shipped to foreign ports.	Total amount.	Average prices.	Valuation.
Apples	barrels	10,046	5,373		15,419	$2 50	$38,547 50
Apples, dried	pounds	445,340	276,025		721,365	8	57,709 20
Ashes, pot	tons	112			112	7 50	840 00
Bacon hams	hhds. and tierces.	7,071	375	1,807	9,253	20 00	185,060 00
Bagging	pieces		1,975		1,975	14 00	27,650 00
Bark, hemlock	cords	210			210	7 00	1,470 00
Barley	bushels	125,065	21,306		146,371	80	117,096 80
Beans	do	15,005			15,005	1 75	26,258 75
Beef	barrels	45,017	9,000		54,017	13 00	702,221 00
Beef	tierces	2,813	1,200		4,013	20 00	80,260 00
Beeswax	pounds	360	1,704		2,064	30	619 20
Brooms	number	216,838	44,975		261,813	15	39,271 95
Butter	pounds	713,201	407,794		1,120,995	15	168,149 25
Butter	firkins	4,320	2,130		6,450	10 00	64,500 00
Calves	number	40			40	6	240 00
Candles	pounds	30,460	189,840		220,300	16	35,248 00
Cattle	number	458,400	3,504,780		3,963,180	4	158,527 20
Cedar, posts	do		450,086		450,086	10	45,008 60
Cheese	pounds	165,822	13,978		179,800	10	17,980 00
Cider	barrels	497	640		1,137	8 00	9,096 00
Cordage and cables	pounds	9,744			9,744	9	876 96
Corn, in the ear	barrels	246,938			246,938	1 50	370,407 00
Corn, shelled	bushels	7,008,136	277,564	221,444	7,507,144	50	3,753,572 00
Corn meal	do	7,480			7,480	60	4,488 00
Cotton, piece goods	pieces	21,480	43,750		65,230	3 00	195,690 00
Cotton, printed or colored	yards	148,973	553,259		702,232	12	84,267 84
Cotton, uncolored	yards	1,738,491	3,774,982		5,513,473	10	551,347 30
Cotton yarn	pounds	2,172	4,891		7,063	50	3,531 50

Eggs	number	201,163	275,864		477,027	1	4,770 27
Feathers	pounds	1,793			1,793	50	896 50
Flax	do	473			473	10	47 30
Flax-seed	bushels	1,874	2,321		4,195	1 25	5,243 75
Flax thread	pounds	743	975		1,718	1 00	1,718 00
Flour	barrels	61,103	12,780	2,640	76,523	7 50	573,922 50
Hay	tons	2,378			2,378	7 50	17,835 00
Hemp	pounds	1,346,294		56,224	1,402,518	7	98,176 26
Hides	number	43,958	5,943		49,901	3 50	174,653 50
Hogs, live	do	1,516	4,385		5,901	12 00	70,812 00
Lard	pounds	1,927,717	540,374	95,140	2,563,321	10	256,332 10
Lard	kegs	4,840			4,840	10 00	48,400 00
Lathes, pine	pieces	14,082,948	22,744,375		36,827,323	¼	92,068 30¾
Leather	rolls	1,161	28,657		29,818	4 00	119,272 00
Lime	barrels	1,841			1,841	1 50	2,761 50
Lumber, black walnut	feet	29,493	12,784		42,277	4	1,691 08
Lumber, oak	do	4,000	174,324		178,324	3	5,349 72
Lumber, pine	do	66,951,239	185,387,961		252,339,200	2	5,046,784 00
Molasses	gallons	335,912	95,487		431,399	50	215,699 50
Mules	number	43	21		64	150 00	9,600 00
Oats	bushels	2,359,709	105,780		2,465,489	30	739,646 70
Oil, castor	gallons	16,973	2,873		19,846	1 05	20,838 30
Oil-cake	pounds	820,630			820,630	1	8,206 30
Oil, lard	gallons	39,607	83,749		123,356	1 00	123,356 00
Oil, linseed	do	21,973	44,928		66,901	1 00	66,901 00
Onions	bushels	2,472			2,472	50	1,236 00
Peaches	do	1,125	2,764		3,889	1 25	4,861 25
Peaches, dried	pounds	87,808	47,916		135,724	10	13,572 40
Peas	bushels	1,970	2,831		4,801	1 50	7,201 50
Pecan-nuts	do	1,137	2,148		3,285	20	657 00
Pelts	number	3,461			3,461	65	2,249 65
Pork	tierces and bbls.	57,397	15,397	9,738	82,532	15 00	1,237,980 00
Potatoes, common	bushels	28,294	13,720		42,014	75	31,510 50
Rice	tierces	369	542		911	15 00	13,665 00
Rye	bushels	42,336			42,336	1 00	42,336 00
Seed, grass	do	21,348			21,348	2 75	58,707 00
Sheep and lambs	number	378	2,734		3,112	2 00	6,224 00
Shingles	do	52,932,681	60,431,970		113,364,651	¼	283,411 62¾
Snuff	pounds	73	149		222	50	111 00

STATEMENT—Continued.

Articles.	Am'nt conveyed coastward.	Am'nt conveyed inland.	Am't shipped to foreign ports.	Total amount.	Average prices.	Valuation.
Spirits, from grain....gallons	855,050	29,473	....	884,523	$0 30	$265,356 90
Spirits of turpentine....do	5,142	4,370	....	9,512	1 00	9,512 00
Staves and heading....number	982,334	415,361	....	1,397,695	15 00	20,965 42
Sugar, cane....pounds	3,729,718	539,473	....	4,269,221	....	....
Square timber, pine....feet	287,899	3,150,960	....	3,438,859	15	515,828 85
Tallow....pounds	912,800	10,374	180,360	1,103,534	13	143,459 42
Tobacco....do	123,822	17,963	....	141,785	50	70,892 50
Tobacco, chewing....do	180,301	44,978	....	225,279	50	112,639 50
Turkeys....number	....	4,974	....	4,974	75	3,730 50
Vinegar....gallons	23,006	1,597	....	24,603	25	6,150 75
Wheat....bushels	1,783,061	575,381	77,575	2,436,017	1 25	3,045,021 25
Whiskey....gallons	716,374	41,341	....	757,715	40	303,086 00
Wine....do	....	4,974	....	4,974	2 00	9,948 00
Wood, hard....cords	42	....	....	42	5 00	210 00
Wool....pounds	1,439,616	75,099	....	1,514,715	30	454,414 50
Woollen yarn....skeins	13,493	10,974	....	24,467	25	6,116 75
Total	....	....	....	....	....	21,115,970 90½

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from Boston, Massachusetts, during the year ending December 31, 1854.

Articles.		Am't shipped to foreign ports.	Valuation.
Apples	barrels	18,409	$54,353
Ashes, pot and pearl	tons	26	3,032
Bacon, in bulk	pounds	710,732	72,063
Bark, hemlock		....	1,135
Beef	barrels	6,610	81,611
Beef	tierces	78	
Beeswax	pounds	8,520	3,324
Biscuit and shipbread	casks	22,883	107,150
Butter	pounds	291,219	66,584
Candles	pounds	759,947	140,041
Cattle	number	45	1,756
Cheese	pounds	201,227	23,623
Cordage and cables	cwt	3,798	69,422
Corn, shelled	bushels	143,359	129,332
Corn meal	do	23,973	109,828
Cotton	pounds	3,361,243	388,425
Cotton, printed or colored		....	1,150,049
Cotton, uncolored		....	810,449
Cotton thread and yarn		....	34
Flour	barrels	71,950	630,363
Hemp	cwt	1,894	18,071
Hides	number	1,205	3,455
Hogs, live	do	134	683
Hops	pounds	104,746	23,668
Horses	number	21	3,735
Lard	pounds	1,853,227	232,884
Molasses	gallons	18,702	10,802
Oil, linseed	do	6,714	6,423
Pork	barrels	16,767	240,455
Potatoes	bushels	31,471	28,963
Rice	tierces	4,049	159,780
Rice	barrels	4,611	
Rye meal	barrels	3,915	15,274
Sheep	number	346	3,106
Snuff	pounds	1,272	261
Spirits, from grain	gallons	42,195	28,631
Spirits of turpentine	do	105,851	74,555
Staves and heading	M	460	31,721
Sugar, cane	pounds	260,062	17,578
Tallow	do	853,274	96,485
Tobacco, manufactured	do	2,266,053	301,083
Tobacco, leaf	hogsheads	692	136,817
Tobacco, leaf	cases	3,494	
Tobacco, leaf	bales	986	
Vinegar	gallons	17,227	2,514
Wheat	bushels	20,675	34,971
Wool	pounds	52,279	19,018
Total		....	5,333,820

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from the city of Cincinnati, Ohio, during the year ending December 31, 1854: *by* Samuel B. W. McLean, *Surveyor of Customs.*

Articles.	River.	Rail-roads.	Canals.	Total.	Average value.	Total value.
Alcohol..........barrels..	9,446	7,940	3,912	21,298	$16 75	$356,741 50
Apples ....do....	2,556	732	196	3,484	1 75	6,097 00
Bagging ....pieces..	2,748	....	....	2,748	2 75	7,557 00
Beans ....barrels..	1,917	57	15	1,989	2 75	5,469 75
Beef...............do....	15,196	3,435	684	19,315	11 00	222,465 00
Beef ....tierces..	4,939	2,835	1,620	9,394	16 00	150,304 00
Bran, &c..........sacks..	9,905	1,673	339	11,917	65	7,746 05
Brooms...........dozen..	12,334	1,890	353	14,577	2 10	30,611 70
Butter...........barrels..	2,580	100	5	2,685	30 00	80,550 00
Butter....firkins and kegs.	29,939	718	235	30,892	10 00	308,920 00
Candles............boxes..	127,349	13,206	1,653	142,208	7 00	995,456 00
Castings ....pieces..	86,741	40,000	2,357	129,098	6 00	774,588 00
Castings ....tons...	1,667	331	473	2,471	100 00	247,100 00
Cattle ....number.	106	15,245	....	15,351	50 00	767,550 00
Cheese.............casks..	8	3	....	11	19 75	217 25
Cheese ....boxes..	98,620	7,615	2,683	108,918	3 25	353,983 50
Coffee ....sacks..	20,111	16,425	6,400	42,936	16 00	686,976 00
Cooperage ....pieces..	106,185	9,100	2,212	117,497	1 00	117,497 00
Corn ....sacks..	41,792	1,600	202	43,594	1 00	43,594 00
Corn meal ....barrels..	325	2	....	327	2 60	850 20
Cotton..............bales...	8,352	5,324	1,253	14,929	43 00	641,947 00
Eggs ....barrels..	3,505	2,110	389	6,004	7 50	45,030 00
Feathers ....sacks...	2,663	4,727	752	8,142	24 00	195,408 00
Flax-seed ....barrels..	1,930	517	117	2,564	4 50	11,538 00
Flour...............do....	129,876	121,000	8,276	259,152	6 30	1,632,657 60
Fruit, dried........bushels..	12,570	15,929	2,070	30,569	1 10	33,625 90
Grass-seed ....barrels..	11,023	1,254	308	12,585	15 00	188,775 00
Grease ....do....	4,175	9,408	2,014	15,597	16 00	249,552 00
Hay................bales...	717	12	....	729	2 50	1,822 50
Hemp ....do....	1,287	3,497	704	5,488	35 00	192,080 00
Hides ....pounds..	....	....	9,601	9,601	10	960 10
Hides ....number..	19,881	13,966	40	33,887	3 00	101,661 00
Horses ....number..	1,441	126	10	1,577	125 00	197,125 00
Iron ....pieces..	187,065	222,048	....	409,113	1 60	654,580 80
Iron ....bundles..	32,098	26,864	....	58,962	4 00	235,848 00
Iron ....tons...	3,551	5,400	7,276	16,227	80 00	1,298,160 00
Lard ....barrels..	36,660	11,886	3,479	52,025	19 00	988,475 00
Lard ....kegs ..	62,793	13,535	2,223	78,551	4 00	314,204 00
Lard oil...........barrels..	30,100	12,849	3,076	46,025	28 00	1,288,700 00
Linseed oil..........do....	3,886	1,841	421	6,148	32 00	196,736 00
Molasses............do....	31,525	22,335	6,008	59,868	8 00	478,944 00
Oats ....sacks...	1,290	1,950	626	3,866	1 00	3,866 00
Oil cake ....tons...	518	850	257	1,625	14 00	22,750 00
Pork and bacon .hogsheads.	39,355	5,916	2,471	47,742	48 00	2,291,616 00
Pork and bacon. ..tierces..	34,200	16,119	4,134	54,453	18 00	980,154 00
Pork and bacon...barrels..	78,737	33,079	8,481	120,297	12 00	1,443,564 00
Pork and bacon....boxes...	14,197	2,778	903	17,878	19 00	339,682 00
Pork, in bulk.....pounds..	695,743	705,000	15,211	1,415,954	5	70,797 70
Potatoes..........barrels..	4,418	802	1,122	6,342	1 25	7,927 50
Rope, twine, &c..packages.	5,911	922	139	6,972	7 00	48,804 00
Salt ....barrels..	18,503	13,068	4,379	35,950	3 00	107,850 00
Salt ....sacks...	13,616	2,042	416	16,074	1 30	20,896 20
Sheep ....number..	70	780	....	850	2 00	1,700 00
Soap ....boxes...	23,925	7,069	1,126	32,120	3 25	104,390 00
Starch..............do....	21,167	3,418	906	25,491	3 25	82,845 75

STATEMENT—Continued.

Articles.	River.	Rail-roads.	Canals.	Total.	Average value.	Total value.
Sugar ....hogsheads.	9,326	28,908	6,670	44,904	$45 00	$2,020,680 00
Sundry merchandise.pa'ges.	284,835	627,160	....	911,995	6 00	5,471,970 00
Sundry merchandise..tons.	2,694	....	7,773	10,467	600 00	6,280,200 00
Sundry liquors....barrels..	30,267	4,505	1,130	35,902	40 00	1,436,080 00
Sundry manufactures..pieces	343,714	12,480	1,485	357,679	4 00	1,430,716 00
Sundry products .packages.	47,549	24,000	2,586	74,135	3 50	259,472 50
Tallow ....barrels..	1,691	6,607	1,711	10,009	29 00	290,261 00
Tobacco ....kegs and boxes	13,028	10,004	2,759	25,791	22 00	567,402 00
Tobacco........hogsheads.	1,255	6,640	1,496	9,391	84 00	788,844 00
Tobacco ....bales...	1,564	1,009	199	2,772	7 00	19,404 00
Vinegar...........barrels..	2,696	2,261	1,069	6,026	2 50	15,065 00
Whiskey...........do....	190,920	39,804	3,773	234,497	8 00	1,875,976 00
White lead........kegs...	37,190	22,000	5,675	64,865	2 00	129,730 00
Wool .... bales...	2,719	2,383	308	5,410	35 00	189,350 00
Wool............pounds..	....	....	7,901	7,901	30	2,370 30
Total	....	....	....	....	....	40,416,467 80

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from Stonington, Connecticut, during the year ending December 31, 1854: *by* Ezra Cheseboro, *Collector.*

Articles.	Am'nt conveyed coastwise.	Am'nt conveyed coastwise by railroad.	Am'nt conveyed inland.	Am'nt shipped to to foreign ports.	Total amount.	Valuation.
Beef....................barrels.	......	....	....	800	800	$12,000
Cotton, piece goods........yards.	......	2,000,000	....	......	2,000,000	120,000
Cotton and wool, plaid......yards.	......	5,556,000	....	......	5,556,000	833,400
Geese...................number.	......	....	2,500	......	2,500	2,500
Pork....................barrels.	..100	....	....	800	900	5,600
Turkeys.................number.	......	....	22,500	......	22,500	18,000
Total	......	....	....	......	7,582,700	991,500

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from Mobile, Alabama, during the year ending December 31, 1854: *by* T. SANFORD, *Collector.*

Articles.	Amount conveyed coastwise.	Am't conveyed inland.	Am't shipped to foreign ports.	Total amount.	Average prices.	Valuation.
Cotton .... pounds.	52,736,794	....	182,374,937	235,111,731	$0 08 $\frac{1}{16}$	$18,955,883 31
Hides........ number..	5,000	17,000	....	22,000	2 00	44,000 00
Lumber, pine........ feet...	10,718,968	....	5,636,508	16,355,476	10 75	175,821 36
Masts and spars........ number..	....	....	1,710	1,710	100 00	171,000 00
Rosin........ barrels..	....	....	3,123	3,123	2 00	6,246 00
Staves and heading........ M.	....	....	140	140	40 33 $\frac{1}{3}$	5,646 66
Tallow........ pounds..	....	....	61,679	61,679	9 $\frac{2}{3}$	5,962 30
Timber, hewn........ tons...	....	....	1,702	1,702	8 00	13,616 00
Total	....	....	....	....	....	19,378,175 63

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from Saco, Maine, during the year ending Dec. 31, 1854: *by* NATHANIEL M. TOLLE, *Collector.*

Articles.	Am'nt conveyed coastward or coastwise.	Am'nt shipped to foreign ports.	Total amount.	Average prices.	Valuation.
Cotton, colored, York Manufacturing Company.............yards.	5,000,000	......	5,000,000	$0 14	$700,000 00
Cotton, uncolored, Pepperell Co....do..	9,784,326	......	9,784,326	......	728,005 86
Cotton thread, Lavonia Co.....pounds.	10,450,000	......	10,450,000	......	....
Heading......................number.	120,000	......	120,000	25	30,000 00
Lumber, pine, spruce, and hemlock.feet.	2,214,000	......	2,214,000	1	22,140 00
Shooks, sugar-box..................M.	218,880	6,120	225,000	70	157,500 00
Wood, hard.....................cords.	675	......	675	5 50	3,712 50
Wood, pine.....................do..	1,950	......	1,950	3 50	6,825 00
Total........................	....	......	....	......	1,648,183 36

Statement of tons of wheat and flour arriving at tide-water, the produce of the State of New York, and its value; the tons and value of that coming from other States by way of Buffalo, Black Rock, Tonawanda, and Oswego, and the tolls; also the tolls of all other articles moving on all the canals, and the total tolls from 1837 to 1853, inclusive.

Years.	Tons from other States.				Tons, the produce of this State.	Total tons arriving at tide-water.	Total value.	Tolls.	Tolls on all other articles.	Total tolls.
	By way of Buffalo.	By way of Black Rock.	By way of Tonawanda.	By way of Oswego.						
1837	27,206	....	....	7,429	81,856	116,491	$9,600,156	$301,739	$987,691	$1,289,430
1838	57,977	....	....	10,010	65,093	133,080	9,883,586	380,161	1,209,196	1,580,357
1839	60,082	7,697	....	15,108	41,797	124,683	7,217,841	404,525	1,210,441	1,614,966
1840	95,573	12,825	....	15,075	121,380	244,862	10,362,862	700,071	1,075,676	1,775,747
1841	106,271	24,843	....	16,667	53,569	201,360	10,165,355	621,046	1,413,836	2,034,882
1842	107,522	13,035	....	14,338	63,336	198,231	9,284,778	606,727	1,142,469	1,749,196
1843	146,126	12,882	....	25,858	63,914	248,780	10,283,454	731,816	1,349,874	2,081,590
1844	145,510	15,668	....	42,293	74,393	277,865	11,211,677	816,711	1,629,663	2,446,374
1845	118,614	17,066	....	44,560	140,223	320,463	15,962,960	851,533	1,794,648	2,646,181
1846	247,860	16,564	....	63,905	91,037	419,366	18,836,412	1,099,325	1,656,781	2,756,106
1847	380,053	18,489	....	87,329	65,334	551,205	32,890,938	1,460,424	2,174,957	3,635,381
1848	253,325	19,376	....	90,411	68,529	431,641	21,148,421	1,126,133	2,126,079	3,252,212
1849	229,983	22,196	....	119,201	63,921	434,444	19,308,595	1,128,164	2,140,162	3,268,226
1850	205,457	24,256	13,815	133,473	98,575	461,781	20,218,188	1,114,519	2,159,317	3,273,196
1851	229,526	25,457	23,316	146,204	63,012	457,624	16,487,652	867,881	2,461,846	3,329,727
1852	246,362	33,336	31,868	182,434	82,772	576,772	22,564,256	995,160	2,123,084	3,118,244
1853	219,868	33,704	34,697	227,631	97,958	613,858	30,034,571	998,962	2,205,756	3,204,718

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture, exported from Philadelphia, Pennsylvania, in the year ending December 31, 1854.

Articles.		Amount shipped to foreign ports.	Valuation.
Apples	barrels	123	$352
Bacon in bulk	pounds	6,142,206	474,178
Beef	barrels	7,738	
Beef	tierces	934	126,184
Beeswax	pounds	24,698	6,645
Biscuit and ship-bread	casks	24,037	80,742
Butter	pounds	471,141	75,224
Candles	do	628,029	98,687
Cattle	number	3	121
Cheese	pounds	63,852	7,450
Cordage and cables	cwt	96	1,537
Corn, shelled	bushels	923,649	792,172
Corn meal	do	90,024	361,976
Cotton	pounds	1,662,056	266,217
Cotton, printed or colored			75,287
Cotton, uncolored			63,799
Flour	barrels	251,495	2,097,486
Hemp	cwt	234	2,250
Hogs, live	number	20	102
Hops	pounds	1,189	449
Horses	number	4	800
Lard	pounds	2,608,243	290,027
Molasses	gallons	1,778	480
Oil, linseed	do	872	694
Pork	barrels	14,385	183,534
Potatoes	bushels	212	235
Rice	tierces	4,487	132,931
Rice	barrels	450	
Rye, oats, &c.			9,014
Rye meal	barrels	9,192	52,546
Sheep	number	30	150
Snuff	pounds	8,237	1,406
Spirits from grain	gallons	4,203	2,512
Spirits of turpentine	do	19,633	13,446
Staves and heading	M	150	9,670
Tallow	pounds	2,515,114	314,255
Tobacco, manufactured	do	325,920	31,643
Tobacco, leaf	hhds	912	89,095
Tobacco, leaf	cases	125	
Tobacco, leaf	bales	108	
Vinegar	gallons	27,671	3,051
Wheat	bushels	187,629	354,213
Total			6,020,560

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from New York city during the year ending December 31, 1854.

Articles.	Amount shipped to foreign ports.	Average prices.	Valuation.
Apples .... barrels....	15,100	$3 00	$45,300 00
Apples, dried .... pounds....	343,124	6	20,587 44
Ashes, pot........ 100 pounds..	1,940,000	6½	126,100 00
Ashes, pearl .... do......	224,800	6	13,488 00
Bacon hams........ pounds....	482,998	9	43,469 82
Bacon in bulk .... do......	6,767,704	7¼	490,658 54
Bacon .... casks	120		
Barley........ bushels....	230	96	220 80
Beans........ do......	6,816	1 62	11,041 92
Beef .... barrels....	11,274	10 00	112,740 00
Beef........ tierces....	10,514	20 00	210,280 00
Beeswax........ pounds....	46,808	28 00	13,106 24
Biscuit and shipbread .... do......	4,628,800	6½	300,872 00
Brooms........ number....	9,672	12½	1,209 00
Butter .... pounds....	711,948	16	113,911 68
Candles .... do......	522,448	20	104,489 60
Cheese........ do......	1,853,420	7	129,739 40
Cider .... barrels....	666	6 50	4,329 00
Cider........ cases	1,706	3 00	5,118 00
Corn, shelled .... bushels....	3,004,691	80	2,403,752 80
Corn-meal........ barrels....	26,456	3 50	92,596 00
Cotton........ bales.....	289,895		
Cotton, piece goods........ cases	11,614		
Flax-seed .... tierces....	1,507		
Flour .... barrels....	2,022,420	6 00	12,134,520 00
Ginseng........ pounds....	5,900	40	2,360 00
Hay .... bales or tons..	3,024	75	2,268 00
Hemp........ tons.....	326,800	230 00	751,640 00
Hickory-nuts .... bushels....	168		
Honey .... pounds....	189,600	45	85,320 00
Hoops........ M......	764,800		
Hops .... pounds....	310,400	27	83,808 00
Horses........ number ...	10	150 00	1,500 00
Indigo .... ceroons ...	17		
Lard .... pounds....	5,353,478	8½	455,045 63
Lard........ kegs.....	7,092	4 50	31,914 00
Lumber, pine .... feet	6,821,868	40 00	272,874 72
Lumber, hemlock .... do......	500,360	20	100,072 00
Lumber, oak........ do......	1,961,114	55 00	107,861 27
Lumber, maple........ pieces	79,970		
Lumber, black walnut........ feet	642,000		
Lumber, cherry, &c........ do......	515,730		
Mast and spars........ pieces.....	253		
Molasses .... gallons....	140,400	20	28,080 00
Oats .... bushels....	1,990	45	895 50
Oil, linseed .... gallons....	14,706	75	11,029 50
Onions........ bushels....	204	1 00	204 00
Peas .... do......	5,640	1 25	7,050 00
Pork........ tierces and barrels	36,076	11 00	396,836 00
Potatoes, common .... bushels....	1,872	1 75	3,276 00
Rice .... tierces....	21,936	9 75	213,876 00
Rye .... bushels....	815,866	1 15	938,245 90
Rye-meal........ barrels....	7,560	3 75	28,350 00
Sheep and lambs........ number....	220		
Shooks........ M......	90,550		
Snuff........ boxes	250		

STATEMENT—Continued.

Articles.	Amount shipped to foreign ports.	Average prices.	Valuation.
Spirits, from grain.................gallons....	947, 440		
Spirits of turpentine.................do......	139, 484	$0 45	$62, 767 80
Staves and heading ....thousand...	2, 690, 000		
Tallow ....pounds....	4, 248, 758	11	467, 363 38
Tobacco, leaf.......................do......	758, 800	7	53, 116 00
Tobacco strips......................do......	1, 225, 000	6½	79, 625 00
Tobacco stems.......................do......	1, 422, 000	4½	63, 990 00
Tobacco, chewing....................do......	2, 901, 284	14	406, 179 76
Twine ....do......	872, 500	15	130, 875 00
Wheat...........................bushels....	6, 986, 496	1 20	8, 383, 795 20
Whiskey ....gallons....	150, 400	1 45	218, 080 00
Wine.............................casks.....	3, 928		
Wool.............................bales.....	673		
Total................................	....	....	29, 765, 828 90

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from the district of Key West, Florida, during the year ending December 31, 1854: *by* John P. Baldwin, *Collector.*

Articles.	Amount conveyed coastwise.	Amount shipped to foreign ports.	Total amount.	Average prices.	Valuation.
Arrowroot.............pounds..	86, 100	1, 500	87, 600	$0 5½	$4, 818 00
Bananas...............bunches.	400	....	400	50	200 00
Cattle ....number.	....	63	63	15 00	945 00
Coco-nuts ....do....	4, 000	....	4, 000	5	200 00
Cotton, Sea Island.......bales ..	62	....	62	80 00	4, 960 00
Fish, salted............tons...	220	....	220	87 00	19, 140 00
Grapes................pounds.	150	....	150	30	45 00
Hides ....number.	450	....	450	1 00	450 00
Hemp, Manilla...........tons...	1	....	1	224 00	224 00
Lemons and limes.......barrels.	205	....	205	4 00	820 00
Molasses..................do...	245	....	245	5 00	1, 225 00
Skins, deer............pounds..	915	....	915	15	137 25
Salt..................bushels.	70, 000	....	70, 000	30	21, 000 00
Sponge ....pounds..	80, 434	....	80, 434	40	32, 173 60
Sugar-cane............hogsheads	252	....	252	30 00	7, 560 00
Turtles ....number.	834	....	834	6 00	5, 004 00
Turtle shell............pounds..	300	....	300	6 00	1, 800 00
Total..................	....	....	....	....	100, 701 85

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from New Orleans, Louisiana, in the year ending December 31, 1854.

Articles.		Am't shipped to foreign ports.	Valuation.
Apples	barrels	54	$226
Bacon	pounds	16,636,350	1,232,341
Bark, hemlock		....	280
Beef	barrels	12,391	167,124
Beeswax	pounds	15,172	4,102
Biscuit and ship-bread	casks	2,113	8,846
Butter	pounds	234,870	36,798
Candles	do	82,204	13,039
Cattle	number	25	983
Cheese	pounds	71,642	8,623
Cordage and cables	cwt	123	2,156
Corn, shelled	bushels	1,535,278	1,083,661
Corn-meal	barrels	106	424
Cotton	pounds	590,056,812	51,430,966
Cotton, printed or colored	yards	....	11,455
Cotton, uncolored	do	....	22,264
Flour	barrels	338,679	2,384,116
Hides	number	2,546	9,229
Hogs, live	do	3	60
Hops	pounds	20	17
Horses	number	71	8,900
Lard	pounds	25,613,800	3,046,887
Molasses	gallons	31,989	6,423
Mules	number	2	100
Oil, linseed	gallons	559	565
Pork	barrels	20,223	243,067
Potatoes	bushels	10,161	9,321
Rice	tierces	222	9,970
Rice	barrels	104	
Rye meal	do	213	887
Rye, oats, &c		....	5,093
Snuff	pounds	547	617
Spirits, from grain	gallons	28,937	15,766
Spirits of turpentine	do	2,125	1,515
Staves and heading	M	3,538	176,644
Sugar, cane	pounds	1,457,408	47,128
Tallow	do	1,537,659	160,645
Tobacco, manufactured	do	77,428	9,958
Tobacco, leaf	hhds	60,941	6,671,196
Tobacco, leaf	bales	396	
Vinegar	gallons	9,587	764
Wheat	bushels	255,842	386,361
Total		....	67,218,525

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from Galena, Illinois, in the year ending December 31, 1854: by DANIEL WANN, *Surveyor.*

Articles.	Am'nt conveyed coastward by river.	Am'nt conveyed coastward by land.	Total amount.	Average price.	Total valuation.
Bacon, 464 hhds............pounds.					
Bacon, in bulk............do..	579,450	....	579,450	$0 07	$40,561 50
Barley............bushels.	9,315	....	9,315	70	6,520 50
Beans............bushels.	1,258	....	1,258	1 00	1,258 00
Beeswax............pounds.	165	....	165	30	49 50
Brooms............dozen.	565	....	565	2 25	1,271 25
Buckwheat flour............pounds.	10,400	....	10,400	3 00	31,200 00
Butter............pounds.	72,599	....	72,599	15	10,889 85
Cordage............pounds.	20,000	....	20,000	20	4,000 00
Corn, shelled............bushels.	21,724	....	21,724	30	6,517 20
Corn meal............barrels.	1,094	....	1,094	1 50	1,641 00
Crackers and hard bread............barrels.	7,000	....	7,000	4 00	28,000 00
Feathers............pounds.	2,000	....	2,000	50	1,000 00
Flour............barrels.	25,894	10,427	36,321	6 25	227,006 25
Fowls, domestic............number.	2,365	....	2,365	15	354 75
Hides, beeve............do...	3,848	1,777	5,625	3 00	16,875 00
Honey............pounds.	1,286	....	1,286	12	154 32
Lard, 809 barrels............do...					
Lard, 395 kegs............do...	199,160	....	199,160	10	19,916 00
Oats............bushels.	12,458	....	12,458	30	3,737 40
Oil, linseed............barrels.	91	....	91	36 00	3,276 00
Onions............bushels.	770	....	770	50	385 00
Pelts, furs, &c............(estimated).	....	....	....	....	8,291 00
Pork............barrels.	4,610	....	4,610	14 00	64,540 00
Potatoes............bushels.	72,947	....	72,947	70	51,062 90
Pig lead............pounds.	23,415,000	3,850,000	27,265,000	5	1,363,250 00
Rye............bushels.	3,500	....	3,500	50	1,750 00
Rye flour............bushels.	202	....	202	4 00	808 00

STATEMENT—Continued.

Articles.	Am'nt conveyed coastward by river.	Am'nt conveyed coastward by land.	Total amount.	Average price.	Total valuation.
Seed, clover .... bushels.	106	....	106	$7 00	$742 00
Seed, flax .... bushels.	75	....	75	1 00	75 00
Seed, Timothy .... bushels.	185	....	185	2 50	462 50
Tallow candles .... boxes.	7, 330	....	7, 330	6 00	43, 980 00
Turkeys .... number.	585	....	585	75	438 75
Wheat .... bushels.	19, 634	1, 049	20, 683	1 00	20, 683 00
Whiskey .... barrels.	2, 754	1, 354	4, 108	12 00	49, 296 00
Wool .... pounds.	1, 500	....	1, 500	25	375 00
Woollen, yarn .... pounds.	2, 800	....	2, 800	1 00	800 00
Total	....	....	....	....	2, 011, 167 67

Statement of the quantity and value of articles of merchandise exported to Canada from the port of Oswego, New York, during the year ending December 31, 1854: *by* E. B. TALCOTT, *Collector of Customs.*

Articles.		Amount shipped to foreign ports.	Average prices.	Valuation.
Apples	barrels	106	$1 89	$200 34
Bagging	pieces	25, 300	33	8, 349 00
Brooms	dozen	1, 803	1 76	3, 173 28
Candles	pounds	10, 144	11½	1, 166 56
Cheese	do	13, 202	10	1, 320 20
Coal	tons	15, 854	7 41	117, 478, 14
Cordage and cables	pounds	10, 192	16	1, 630 72
Corn, shelled	bushels	61, 967	69	42, 757 23
Cotton, printed or colored	yards	640, 730	10	64, 073 00
Cotton, uncolored	do	285, 837	8	22, 866 96
Cotton, thread	pounds	9, 150	20	1, 830 00
Flour	barrels	3, 140	6 13	19, 248 20
Gypsum, ground	do	21, 718	90	19, 546 20
Hides	number	6, 342	2 36	14, 967 12
Honey	pounds	12	25	3 00
Hops	do	6, 838	32	2, 188 16
Indigo	do	589	2 00	1, 178 00
Lard	do	51, 800	10	5, 180 00
Lime	barrels	15, 245	1 10	16, 769 50
Lumber, pine	feet	160	2	3 20
Molasses	gallons	37, 642	50	18, 821 00
Onions	bushels	573	75	429 75
Pork	barrels	3, 444	12 20	42, 016 80
Rice	tierces	361	31 40	11, 335 40
Salt	bushels	390, 480	31	121, 048 80
Snuff	pounds	14, 177	23	3, 260 71
Sugar, cane	do	887, 843	6	53, 270 58
Tallow	do	3, 689	10	368 90
Tobacco, leaf	do	60	25	15 00
Tobacco, chewing	do	482, 387	23	110, 949 01
Total				705, 444 76

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from Georgetown, D. C., during the year ending December 31, 1854: *by* R. WHITE, *Collector.*

Articles.		Amount shipped to foreign ports.	Valuation.
Beans	bushels	80	$90 00
Butter	pounds	2, 240	292 00
Bread	barrels	200	700 00
Flour	do	4, 359	34, 118 00
Fish	do	197	988 00
Lumber, pine	1,000 feet	70	1, 260 00
Total			37, 448 00

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from New London, Connecticut, during the year ending December 31, 1854: *by* HENRY HOBART, *Collector of Customs.*

Articles.	Amount shipped to foreign ports.	Average prices.	Valuation.
Apples, dried .... pounds.	22,055	$0 09	$1,984 95
Bacon hams, in various packages .... do...	13,000	13	1,690 00
Beans .... bushels.	314	2 09	656 26
Beef .... barrels.	1,522	15 25	23,210 50
Beef .... tierces	303	17 00	5,151 00
Biscuit and ship-bread .... bbls. or kegs.	383,000	6	22,980 00
Brooms .... number.	21	....	2 94
Butter .... pounds.	7,575	21½	1,628 62
Cabbage .... number.	....	....	21 00
Charcoal .... bushels.	....	....	3 00
Cheese .... pounds.	2,333	12	279 96
Cordage and cables .... do...	199,660	5	9,983 00
Corn, shelled .... bushels.	177	1 00	177 00
Corn meal .... do...	156	1 25	195 00
Flour .... barrels.	3,342	9 24	30,880 08
Lumber, pine .... feet..	286,000	34 40	9,838,400 00
Lumber, hemlock .... do...	63,500	22 50	1,428,750 00
Lumber, oak .... do...	6,500	40 20	261,300 00
Lumber, oak trees .... number.	8	10 00	80 00
Molasses .... gallons.	14,600	31⅛	4,544 25
Oil, linseed .... do...	396	96	380 16
Onions .... bushels.	115	72	82 80
Peaches, dried .... pounds.	2,000	10	200 00
Peas .... bushels.	34	2 50	85 00
Pickles .... pounds.	....	....	30 00
Pork .... barrels.	2,579	12 32	31,773 28
Potatoes, common .... bushels.	300	85	255 00
Preserved meats .... boxes...	....	....	243 00
Rice .... tierces.	15	41 00	615 00
Shooks .... M.	24,662	1 32$\frac{3}{20}$	32,590 83
Spirits from grain .... gallons.	4,300	46½	1,999 50
Spirits of turpentine .... do...	310	93½	289 85
Sugar .... pounds.	9,871	7	690 97
Tar and pitch .... barrels.	122	3 82	466 04
Tobacco, chewing .... pounds.	26,953	15	4,042 95
Vinegar .... gallons.	4,947	9½	469 96
Whiskey .... do...	3,080	57$\frac{7}{10}$	1,777 16
Wood, hard .... cords..	20	5 00	100 00
Total	....	....	11,708,009 06

Statement of the quantity and value of articles, the products of the chase, in the Territory of Minnesota, exported through the port of Pembina, during the year 1854: *by* PHILIP BEAUPRÉ, *Collector of Customs.*

Articles.	Number.	Average prices.	Valuation.
Badger skins......number..	500	$0 25	$125 00
Bear, black, skins......do....	50	8 50	425 00
Bear, brown, skins......do....	10	7 00	70 00
Buffalo, dressed, robes......do....	4,000	3 00	12,000 00
Buffalo, dressed, skins......do....	1,500	1 00	1,500 00
Buffalo, dried, meat......pounds..	9,000	4	360 00
Buffalo, fresh, meat......do....	180,000	4	7,200 00
Fisher skins......number..	50	2 50	125 00
Fox skins......do....	6,000	1 50	9,000 00
Fox, cross, skins......do....	50	7 50	375 00
Fox, silver gray, skins......do....	15	20 00	300 00
Fox, kit, skins......do....	2,000	25	500 00
Lynx skins......do....	15	1 25	18 75
Martin skins......do....	200	3 00	600 00
Mink skins......do....	1,500	75	1,125 00
Muskrat skins......do....	600	6	36 00
Otter skins......do....	50	4 50	225 00
Pemmican......pounds..	180,000	5	9,000 00
Racoon skins......number..	500	50	250 00
Skunk skins......do....	2,000	50	1,000 00
Tallow......pounds..	40,000	6	2,400 00
Wolf skins......number..	3,000	75	2,250 00
Wolverine skins......do....	10	1 25	12 50
Total......	......	......	48,897 25

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from the district of Perth Amboy, New Jersey, during the year ending December 31, 1854: *by* F. W. BRINLEY, *Collector of Customs.*

Articles.	Am'nt conveyed coastwise by river.	Average prices.	Valuation.
Apples......barrels....	13,264	$3 00	$39,792 00
Apples, dried......pounds....	33,000	......	1,500 00
Barley......bushels ...	6,486	70	4,540 20
Beans......do......	6,400	1 00	6,400 00
Beeswax......pounds....	1,500	......	375 00
Brick, common......number ...	8,800,000	5 00	44,000 00
Brick, fire......do......	5,200,000	35 00	182,000 00
Brooms......do......	25,000	......	3,000 00
Buckwheat......bushels....	3,000	1 00	3,000 00
Butter......pounds....	74,500	20	14,900 00
Butter......firkins	1,700	6 00	10,200 00
Calves......number ...	26,200	3 00	78,600 00
Cattle......do......	18,500	40 00	740,000 00
Charcoal......bushels....	2,510,000	15	376,500 00
Cheese......pounds....	50,000	10	5,000 00
Cherries......quarts	50,000	12½	6,250 00

STATEMENT—Continued.

Articles.	Am'nt conveyed coastwise by river.	Average prices.	Valuation.
Cider .... barrels....	7,000	$3 00	$21,000 00
Clay .... tons	34,000	3 00	102,000 00
Corn, shelled .... bushels ...	210,500	1 00	210,500 00
Corn-meal .... do......	8,766	1 25	10,957 50
Corn-meal .... bags	2,940	....	3,675 00
Cranberries .... barrels....	2,000	4 00	8,000 00
Earthen-ware	....	....	60,000 00
Eggs .... dozen.....	84,000	27	22,680 00
Flour .... barrels....	16,500	6 00	99,000 00
Ham .... pounds....	150,000	12½	18,750 00
Hay .... tons	6,402	18 00	115,236 00
Hogs, live .... number ...	4,000	5 00	20,000 00
Honey .... pounds....	8,000	10	800 00
Hoop-poles .... M......	550	12 00	6,600 00
Horses .... number ...	3,400	80 00	272,000 00
Iron, castings .... tons	5,000	60 00	300,000 00
Lard .... pounds....	60,000	10	6,000 00
Lumber, pine .... 1,000 feet..	1,000	18 00	18,000 00
Lumber, cedar .... do......	2,000	28 00	56,000 00
Lumber, cedar-rails .... number ...	60,000	10	6,000 00
Mules .... do......	5,300	100 00	530,000 00
Oats .... bushels ...	113,419	40	45,367 60
Onions .... do......	17,500	1 00	17,500 00
Oysters .... baskets ...	300,000	2 00	600,000 00
Peaches .... bushels ...	252,000	1 00	252,000 00
Peaches, dried .... do......	1,400	....	2,800 00
Peas .... baskets ...	4,000	1 50	6,000 00
Plums .... bushels....	1,900	2 00	3,800 00
Pork .... pounds....	240,000	6	14,400 00
Potatoes, common .... bushels ...	945,642	1 00	945,642 00
Potatoes, sweet .... do......	4,000	1 50	6,000 00
Poultry .... number ...	41,000	....	24,600 00
Rye .... bushels ...	36,200	1 00	36,200 00
Sheep and lambs .... number ...	102,000	....	243,000 00
Spirits from grain .... gallons....	168,000	40	67,200 00
Strawberries .... quarts	75,000	12½	9,375 00
Tallow .... pounds ...	14,000	10	1,400 00
Wheat .... bushels ...	20,000	1 25	25,000 00
Wood, pine .... cords.....	20,000	4 00	80,000 00
Wood, hard .... do......	10,000	5 00	50,000 00
Whortleberries .... bushels....	34,000	4 00	136,000 00
Total	....	....	5,969,540 30

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from the district of St. Mark's, Florida, during the year ending December 31, 1854: *by* HUGH ARCHER, *Collector of Customs.*

Articles.		Amount coastwise.	Average price.	Valuation.
Beef, dried	pounds	1,600	$0 03	$48 00
Beeswax	do	2,500	25	625 00
Cattle, beef	number	266	12 00	3,192 00
Cotton, upland	bales	45,407	40 00	1,816,280 00
Cotton, Sea Island	do	1,518	51 00	77,418 00
Cotton yarn	do	1,142	35 00	39,970 00
Fish	barrels	1,653	6 00	9,918 00
Furs	bales	4	25 00	100 00
Hides, beeve	number	6,714	1 40	9,399 60
Hides, beeve	bales	23	40 00	920 00
Honey	barrels	2	15 00	30 00
Lemons	do	6	5 00	30 00
Logs, live oak	cubic feet	28,360	40	11,344 00
Logs, red cedar	do	36,260	20	7,252 00
Logs, palmetto	number	764	1 25	955 00
Molasses	hogsheads	2	25 00	50 00
Molasses	barrels	306	10 00	3,060 00
Moss	bales	6	12 00	72 00
Oil, rosin	barrels	320	15 00	4,800 00
Potatoes	do	20	3 00	60 00
Rosin and pitch	do	12,688	2 00	25,376 00
Skins	bales	71	25 00	1,775 00
Skins, deer	number	1,344	25	336 00
Sugar	hogsheads	400	40 00	16,000 00
Sugar	barrels	299	15 00	4,485 00
Tallow	do	8	20 00	160 00
Tar	do	1,045	3 00	3,135 00
Tobacco, leaf	cases	935	100 00	93,500 00
Turpentine, spirits of	barrels	2,574	20 00	51,480 00
Venison hams, dried	do	2	5 00	10 00
Wool	bales	56	60 00	3,360 00
Total				2,185,140 60

Statement of the quantity and value of articles of merchandise of domestic growth and manufacture exported from the district of Camden, North Carolina, during the year ending December 31, 1854: *by* L. D. STARKE, *Collector of Customs at Elizabeth City.*

Articles.		Am't shipped to foreign ports.	Average prices.	Valuation.
Corn, shelled	bushels	78	$1 00	$78 00
Lumber, pine	feet	169,000	2	3,380 00
Peas	bushels	476	1 57	747 32
Staves and heading	M	974,000	25 00	24,350 00
Tobacco, chewing	pounds	415	17	70 55
Total				28,625 87

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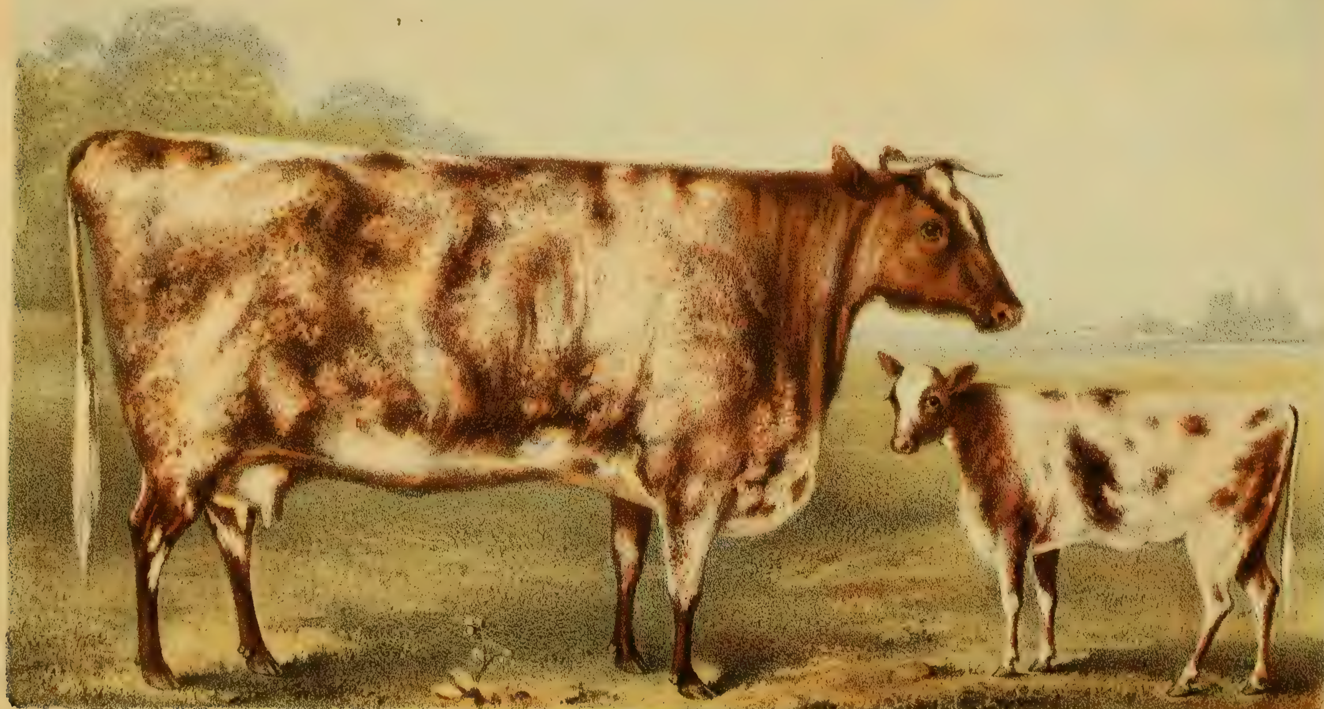
S.



W. H. Davis, pinx. Lith. of Sarony & Co. New York

SHORT-HORNED COW FIDELLE, AND CALF.

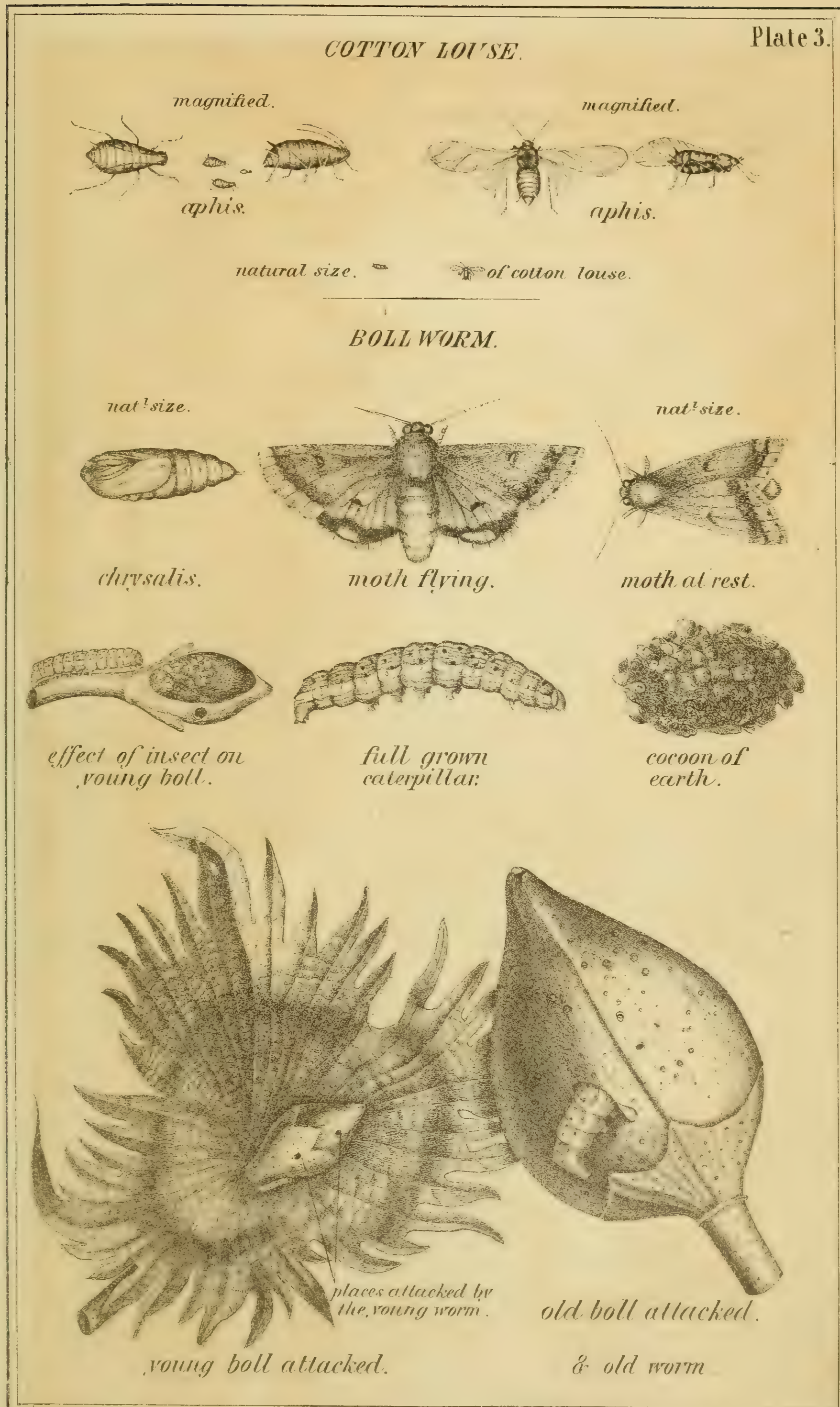
Bred by Thomas Robinson, Esq., of Burton on Trent, 1848.

Plate II.

W. H. Davis, Pinx.t

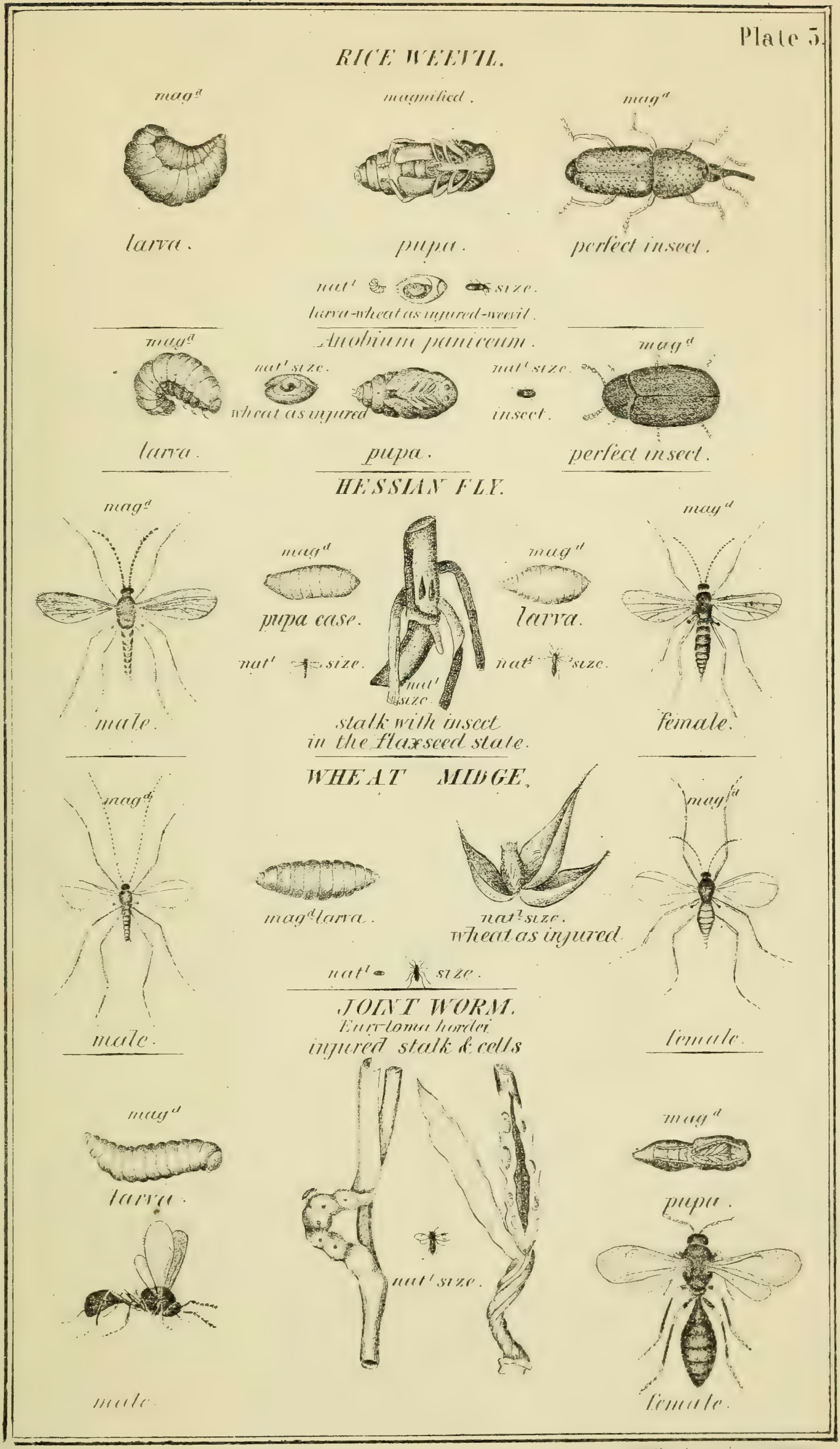
Short horned Bull Wiseton, bred by Earl Spencer.

INSECTS INJURIOUS TO THE
COTTON.



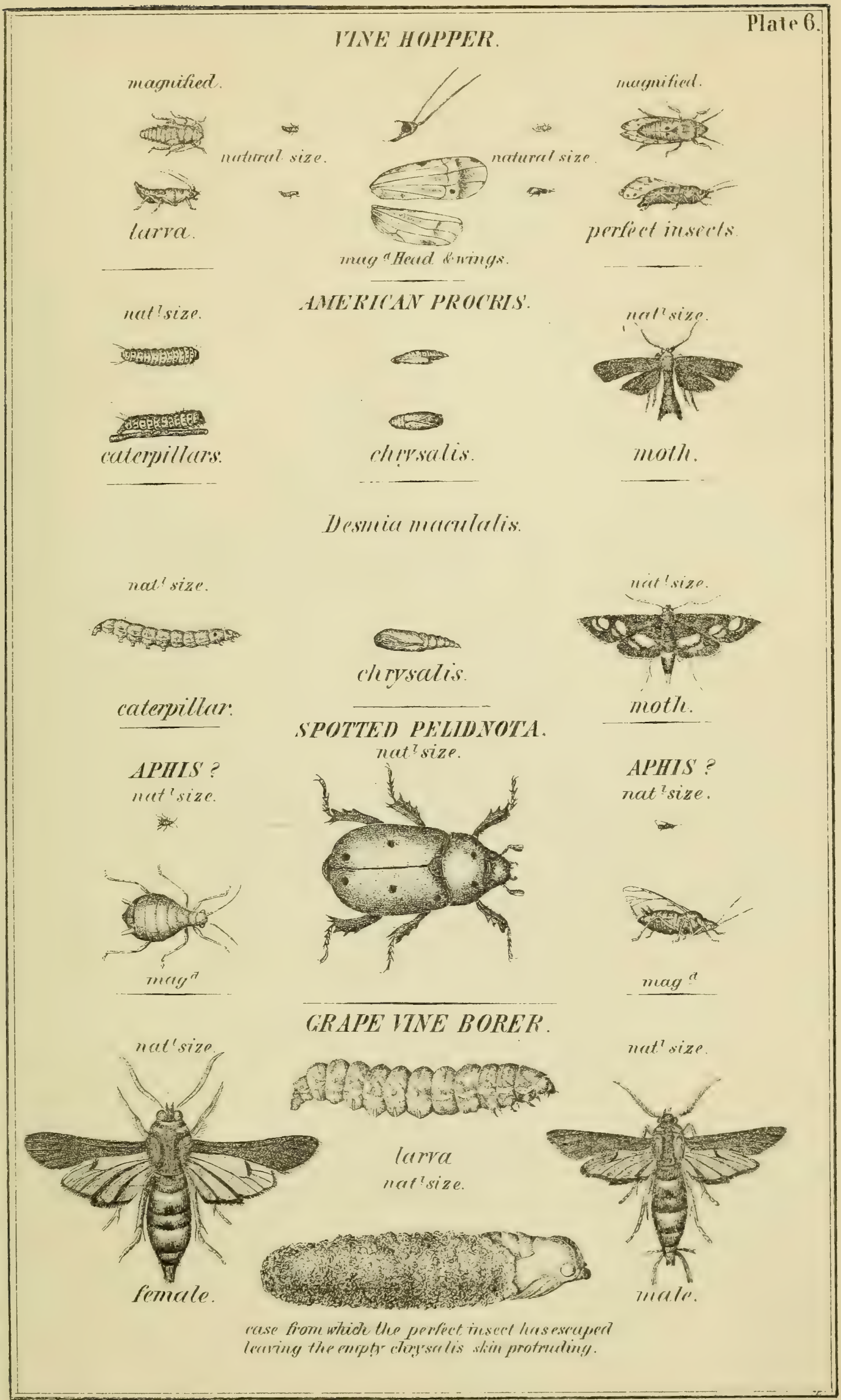
INSECTS INJURIOUS TO THE CORN.

INSECTS INJURIOUS TO WHEAT.



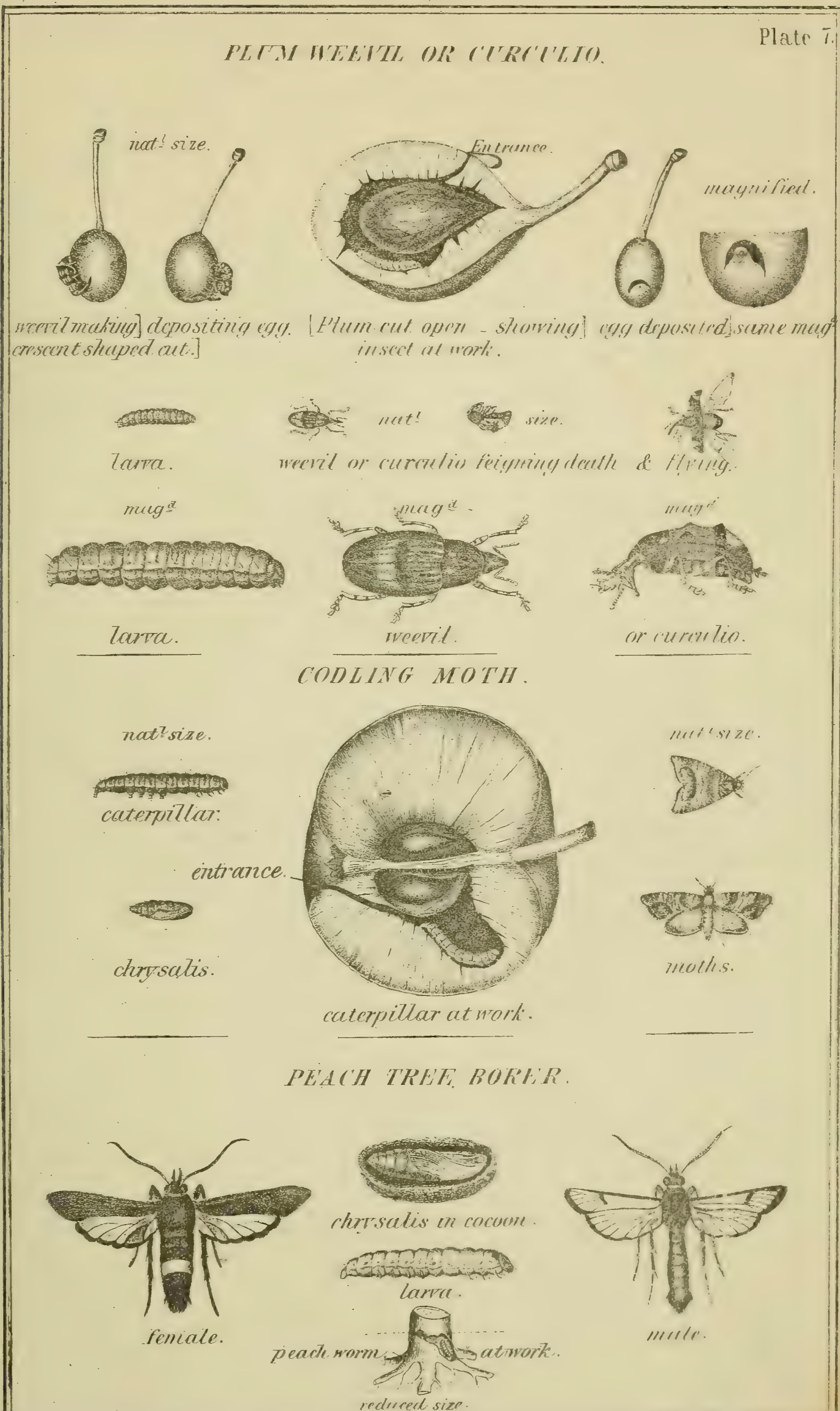
INSECTS INJURIOUS TO THE

GRAPE VINE.



INSECTS INJURIOUS TO

FRUIT.

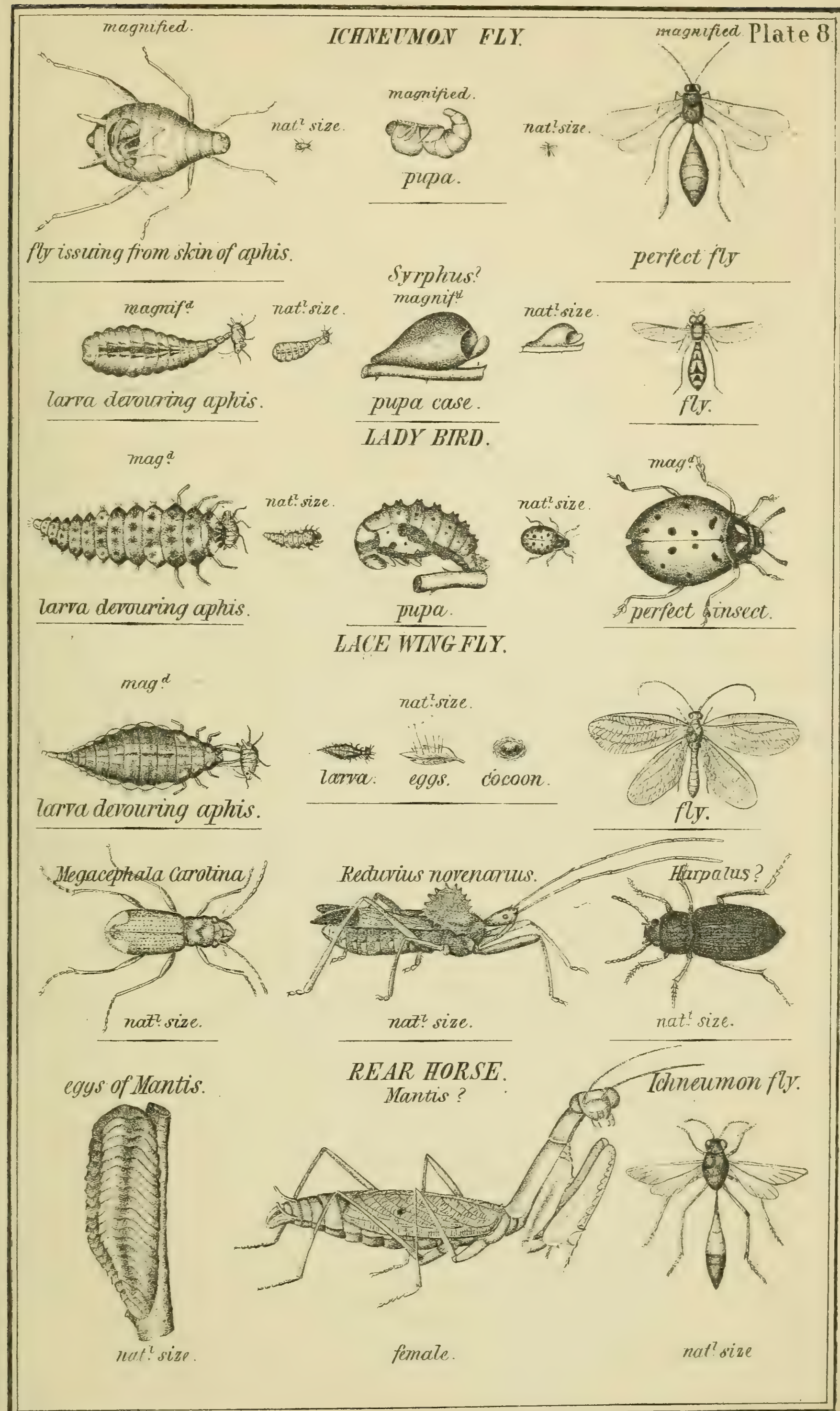


James Ackerman Lith 379 Broadway N.Y.

INSECTS BENEFICIAL

TO THE AGRICULTURIST.

As their food consists of other insects injurious to vegetation.



James Ackerman Lith. Broadway NY.

Drawn from nature & eng.d by T. Glover